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Coastal and Hydraulics Laboratory

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Engineer Research and Development Center

Barbers Point Harbor, Nighttime Simulation

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Final report

Prepared for U.S. Army Engineer District, Honolulu
Fort Shafter, HI 96858-5440

Abstract: Kalaeloa Barbers Point Harbor is located on the southwestern side of Oahu, HI. The purpose of this study was to analyze the possibility of nighttime transit into and out of the harbor. Changes in navigational aids as well as the addition of shoreline lighting were tested in the U.S. Army Engineer Research and Development Center's Ship/Tow Simulator with the assistance of Pilots from Hawaii. For the possibility of nighttime transit to exist, improvements to the navigational aids, as well as improved methods of predicting the currents at the approach, would first have to be implemented.

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Preface

This navigation study was performed by the Coastal and Hydraulics Laboratory (CHL), U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, MS, for the U.S. Army Engineer District, Honolulu.

The investigation was conducted by Gary C. Lynch, with the assistance of Sally Harrison, Donna Derrick, and Peggy Van Norman, Deep Draft Navigation Group, Navigation Branch, CHL, under the direct supervision of Dennis Webb, Chief, Navigation Branch. Simulation tests were conducted at the ERDC Ship/Tow Simulator Facility located in Vicksburg, MS.

Acknowledgment is made to Thomas Smith, Honolulu District, for cooperation and assistance. Special thanks are extended to the Department of Transportation of Hawaii and the Hawaii Pilot Association for their participation in the study.

This study was performed under the supervision of Thomas W. Richardson, Director, CHL.

COL Richard B. Jenkins was Commander and Executive Director of ERDC. Dr. James R. Houston was Director.

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
feet	0.3048	meters
knots	0.5144	meters per second

1 Background

Project description

Kalaeloa Barbers Point Harbor is located on the southwestern side of Oahu (Figure 1).

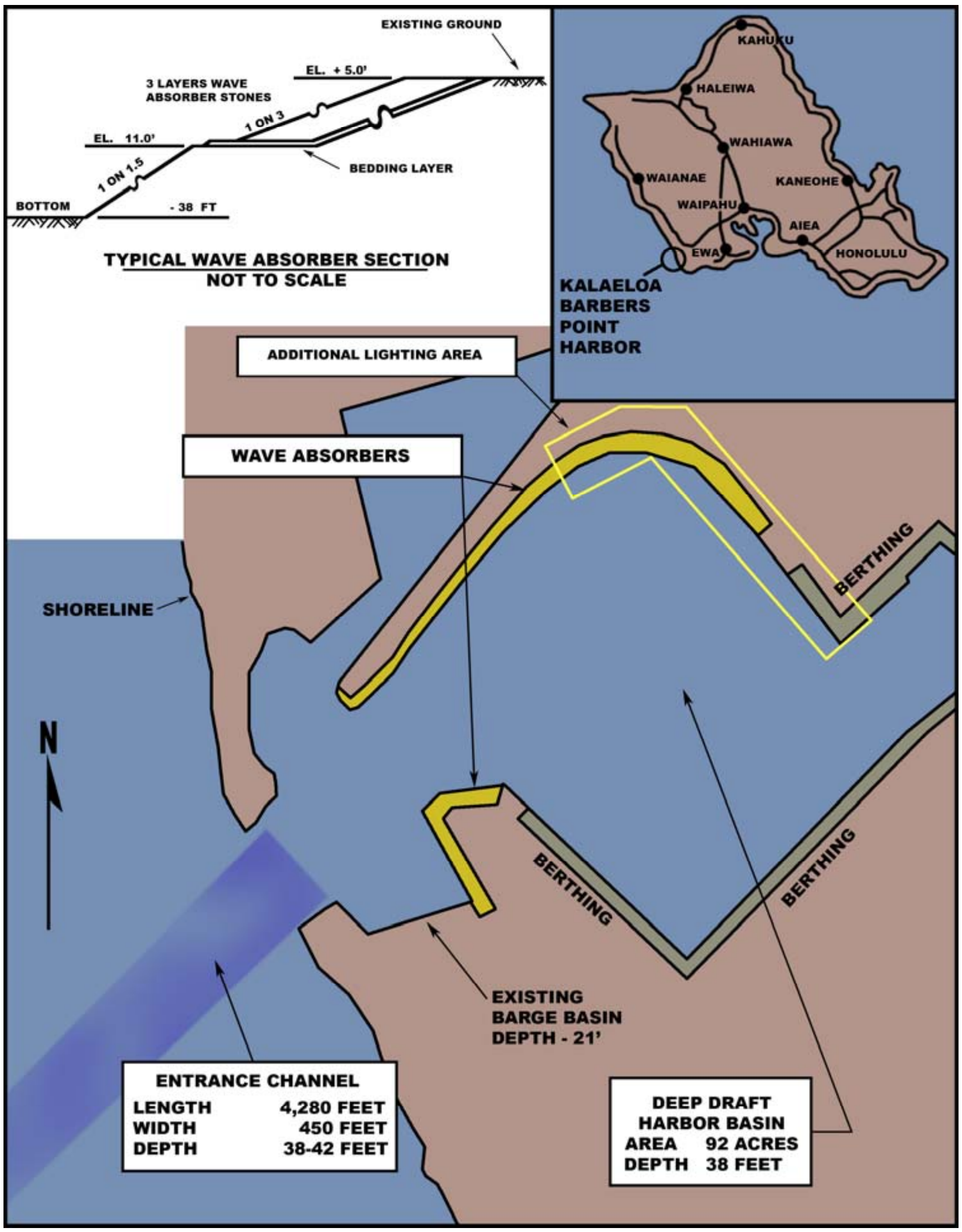


Figure 1. Project location map.

The entrance channel for the harbor is 450 ft wide, 3,100 ft long, and 42 ft deep, transitioning into a 38-ft-deep inner channel 980 ft long that flares into the harbor itself. At this time, traffic in Kalaeloa Barbers Point Harbor is limited by the conditions set forth in Harbor Master's Notices 5-92 and 7-92 (Appendix A).

The purpose of this study was to analyze the possibility of safe nighttime navigation with additional shoreline lighting inside the harbor (Figure 1). The proposed terminal improvements for the harbor would increase the amount of light illuminating the northeastern shoreline of the harbor possibly making it accessible 24 hr a day.

Navigation concerns

At first glance, Kalaeloa Barbers Point Harbor appears to be a simple harbor with deep water up to the short entrance channel and a fairly small basin. The harbor is compact and unobtrusive. However, wind and wave conditions as well as cross currents can make the entrance difficult. Vessel maneuvering speed must be reduced quickly once inside the protected harbor to avoid damage to docked vessels. Since currents in the area do not necessarily follow the wind and wave patterns, reading the currents is next to impossible. A deep draft vessel, such as a loaded tanker, will be affected more by the currents, whereas a light vessel, containership, or passenger vessel, would be more affected by the wind and waves.

Because the entrance channel is short, when using the ranges (Figure 2) there are several concerns that are unique to Kalaeloa Barbers Point Harbor. One concern is the fact that by the time the ranges show a significant distance off track, the vessel is already in trouble. Also, on outbound transits there are only three sets of navigation aids to guide the ship out of the navigation channel. These concerns would be further exacerbated in the anticipated nighttime operation, as well as the deeper drafting ships in conjunction with the proposed deepened channel. Most of the visual cues that a pilot relies upon during a daytime transit are absent during nighttime runs. Cultural lights (i.e., distant - town, business, factory, subdivision type lights), navaid lights, and objects that are lit and close enough to the channel to be distinguishable (such as buildings and tanks in and around the harbor) are all that remain.

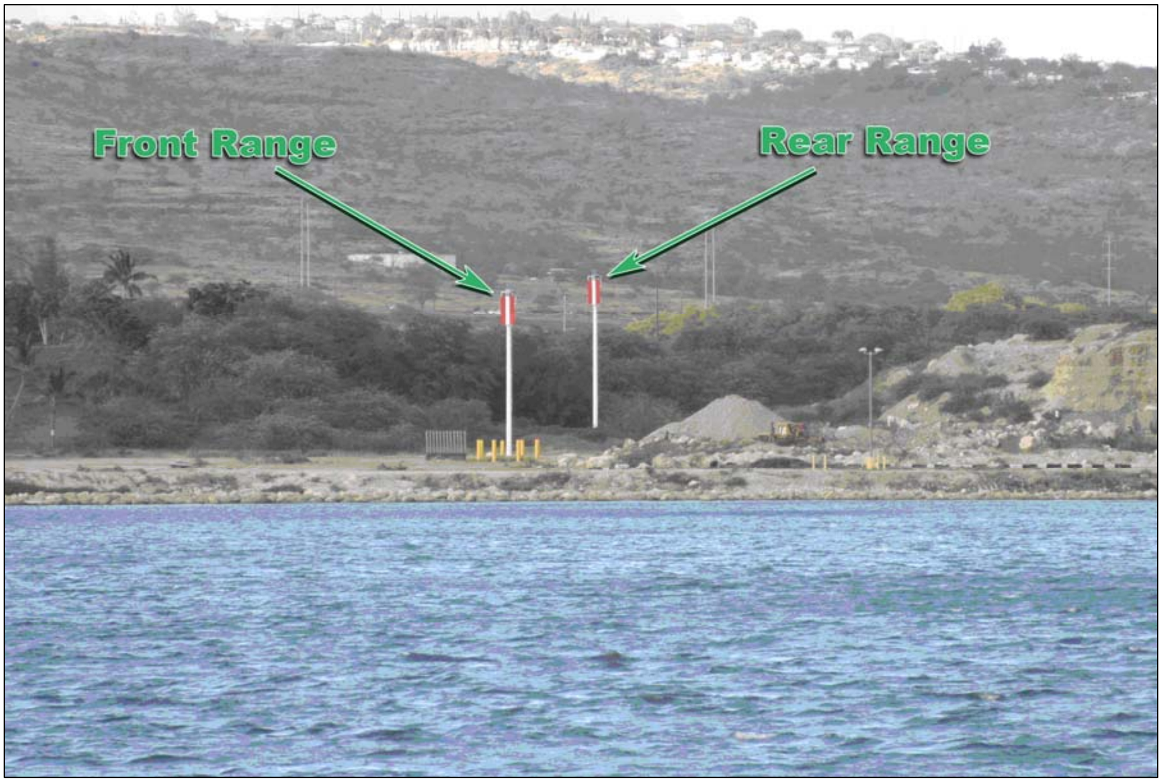


Figure 2. Kalaeloa Barbers Point Harbor existing navigational ranges.

Project approach

This navigation simulation project uses results of the "Physical and Numerical Model Studies of Barbers Point Harbor, Oahu, Hawaii"[1] as well as input from the locally licensed pilots (Hawaii Pilots), the Honolulu District, and the Hawaii Department of Transportation – Harbor's Division (DOT-H). The actual testing schedule that was developed will be discussed in the Simulation Testing Program section; however, it should be noted that the District, DOT-H, and Hawaii Pilots were all involved in the coordinated design effort.

[1] Michael J. Briggs, Linda S. Lillycrop, Gordon S. Harkins, Edward F. Thompson, and Debra R. Green. 1994. *Physical and numerical model studies of Barbers Point Harbor, Oahu, Hawaii*. TR CERC-94-14. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

2 Simulation Database Generation

Required data

Data necessary for the creation of a navigation simulation study include the channel and harbor layout, bathymetry, and currents, for both the existing and the design conditions. There are several ways to obtain and/or collect these data. The data used for each component of the simulation database will be discussed later in this report.

Visual scene

The visual scene is the most involved of the simulation study components and is typically carried out after a reconnaissance (recon) trip to the Project Site has been completed. During the recon trip, digital video and still photos are taken of the area to help in the design and construction of the existing visuals. In this particular project, nighttime photos were also taken to show the amount of light that normally comes from the lights at the harbor terminals. It is at this time that the pilot experiences are gleaned for any abnormalities in the area that might not be readily apparent from the navigational charts, photos, etc. Any landmarks that the pilots might use for navigation are also noted to be included in the visual scene. Figures 3 – 5 show examples of recon still photos taken during the May 2004 recon trip.

These photos were taken during the daytime. Since this project was designed for nighttime runs, photos were also taken at night to see how much the pilot would actually be able to see (Figures 6 and 7).

In addition to the recon photos and video, recent aerial photos of the project area were obtained if possible, along with navigation charts and design plan drawings for any changes to be made. With these items in place, the basic layout for the project was assembled in a three-dimensional, computer-aided design package (Figure 8).

Included in the project layout was the Point of Origin -- the point at which coordinates for the simulator are measured from (in meters). For Kalaeloa Barbers Point Harbor, the point of origin was 21 deg 19 min North by 158 deg 8 min West.

Figure 3. Recon photo for visual scene development.

Figure 4. Recon photo of harbor area for scene development.

Figure 5. Recon photo of dry dock.

Figure 6. Nighttime recon photo from eastern side of harbor.

Figure 7. Nighttime recon photo of northern jetty inside of harbor area with existing lights.

Once the layout of the project is decided, the terrain is constructed from elevation data. Objects are then built and added to the visual scene using the program CREATOR from MultiGen-Paradigm. Objects include buildings, trees, navaids, and bridges in the project area. These objects are included based upon their importance to navigation and their contribution to the overall atmosphere of the simulation program. This program creates objects in the OpenFlight or “flt” format. Objects are colored and/or textured before adding them to the finished visual scene. An example of the finished visual scene is shown in Figure 9.

One concern during testing was the fact that pilots do not currently bring vessels in at night. This fact led to speculation as to how accurate the nighttime visual would be compared with what the pilot would see from a ship during nighttime transits. Fortunately, these concerns were resolved prior to the end of the testing. A vessel approached Kalaeloa Barbers Point Harbor in February 2005, but before the pilot could board the vessel, it grounded to the southern side of the channel. Once grounded, the ship was required to have a pilot onboard 24 hr a day until it could be salvaged.

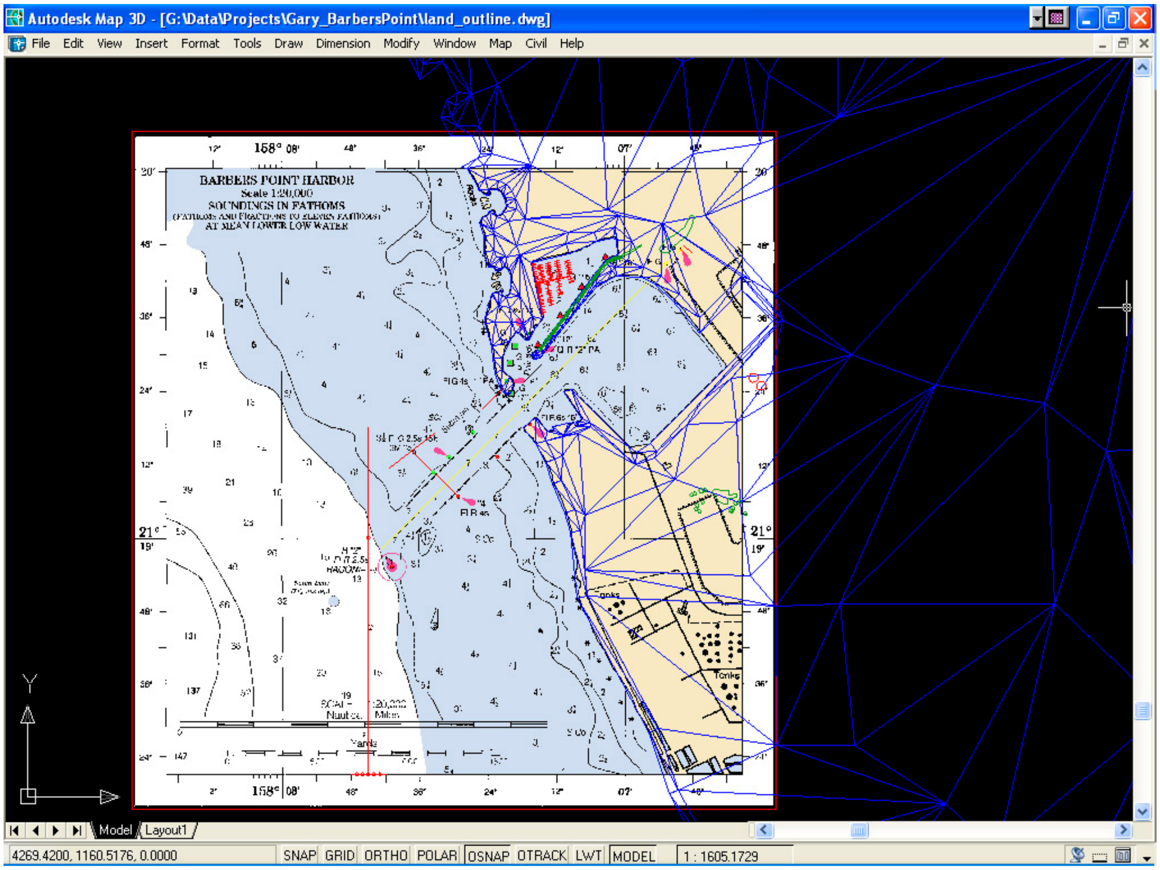


Figure 8. Project layout for Kalaeloa Barbers Point Harbor.

Figure 9. Nighttime visual scene for Kalaeloa Barbers Point Harbor.

The last set of pilots to test in the U.S. Army Engineer Research and Development Center's (ERDC's) Ship/Tow Simulator had been onboard the grounded vessel several times at night and agreed that the simulator did provide a reasonably accurate representation of the nighttime visual scene.

Electronic chart display

The electronic chart display (ECDIS) used for this project was obtained from the C-Map database used in the simulator. This image is adjustable in its scale and the degree of detail shown. It is typical of an ECDIS that many ships are beginning to carry on the bridge. An example screen is shown in Figure 10.

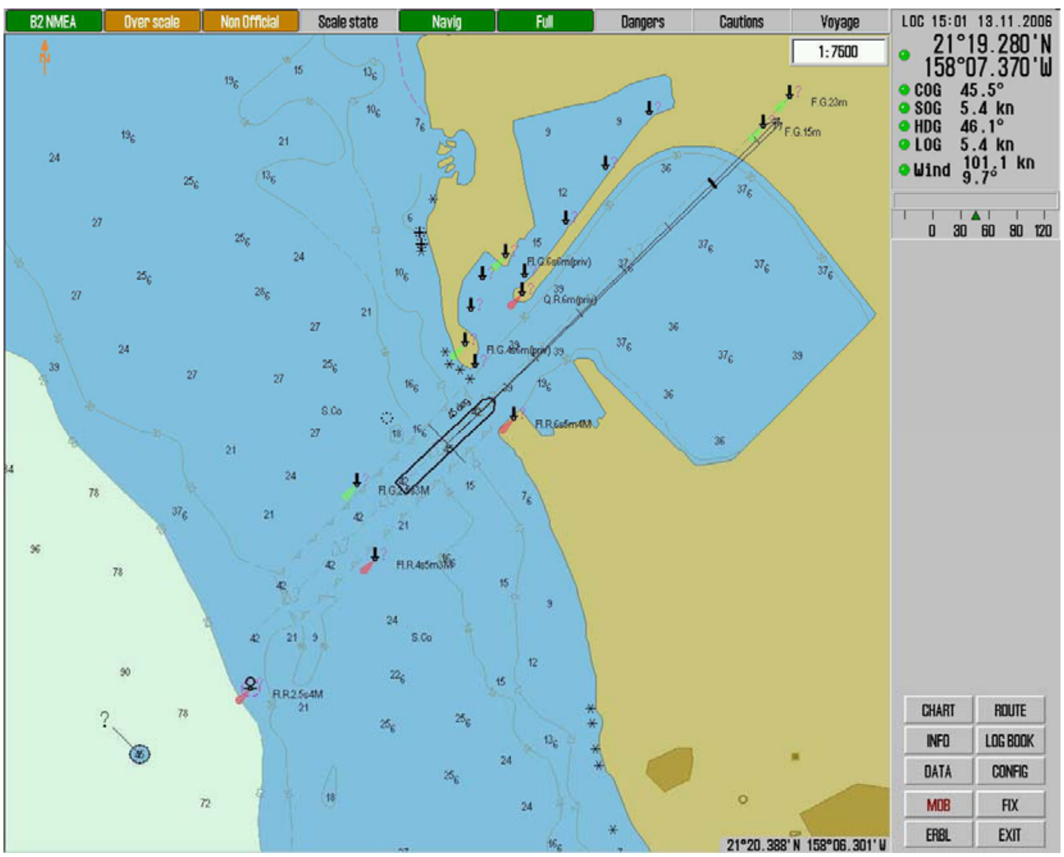


Figure 10. Example of ECDIS display.

Radar display

The radar display database is created directly from the visual scene base drawing and is displayed as a typical radar image (Figure 11).

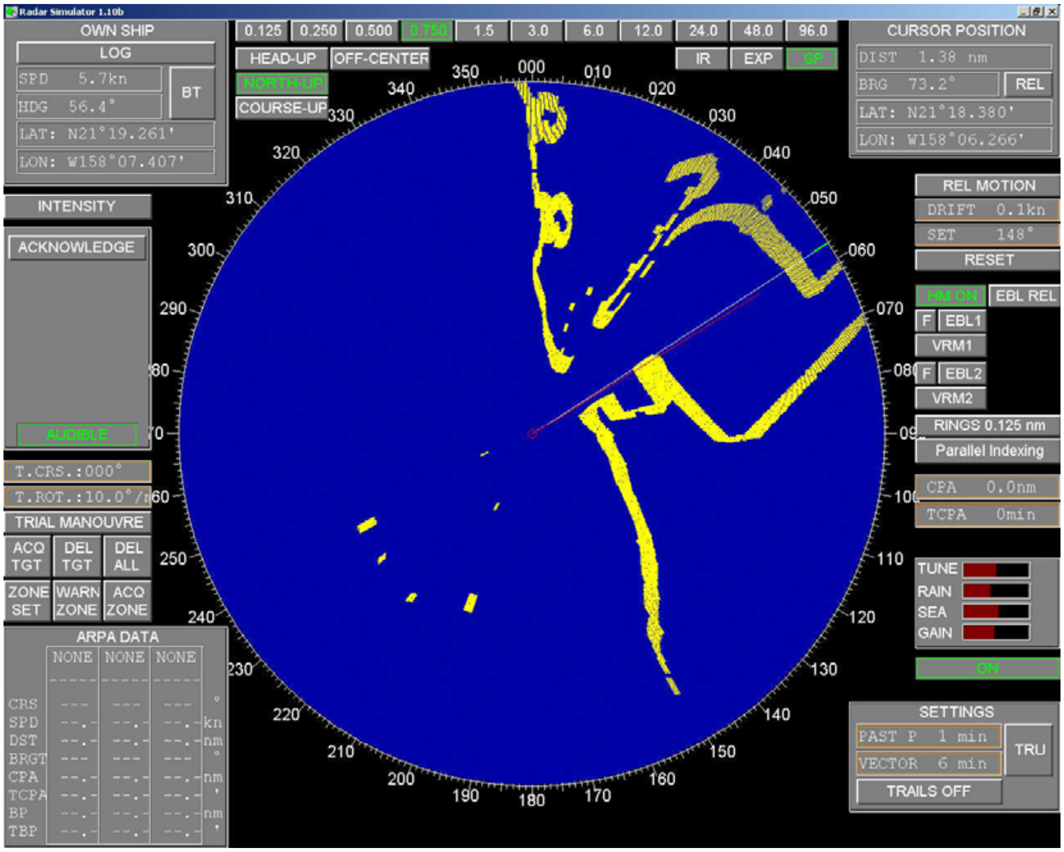


Figure 11. Example radar image display.

Environmental conditions

Environmental conditions include currents in the transit zone, wind forces, and wave forces. Currents were taken from Briggs et al. (1994) along with observations from the pilots. Wind and wave conditions were derived from talks with the pilots and District personnel. The initial sets of currents are shown in Figures 12 – 19. These figures show the direction and magnitude for “regions” of currents bounded by the double arrows. Currents between these regions are interpolated between the end of one region and the beginning of the next.

For most of these conditions, the currents increase approaching the sea buoy. These are currents driven by ocean currents. Once beyond the first set of buoys, currents are mostly wind-driven.

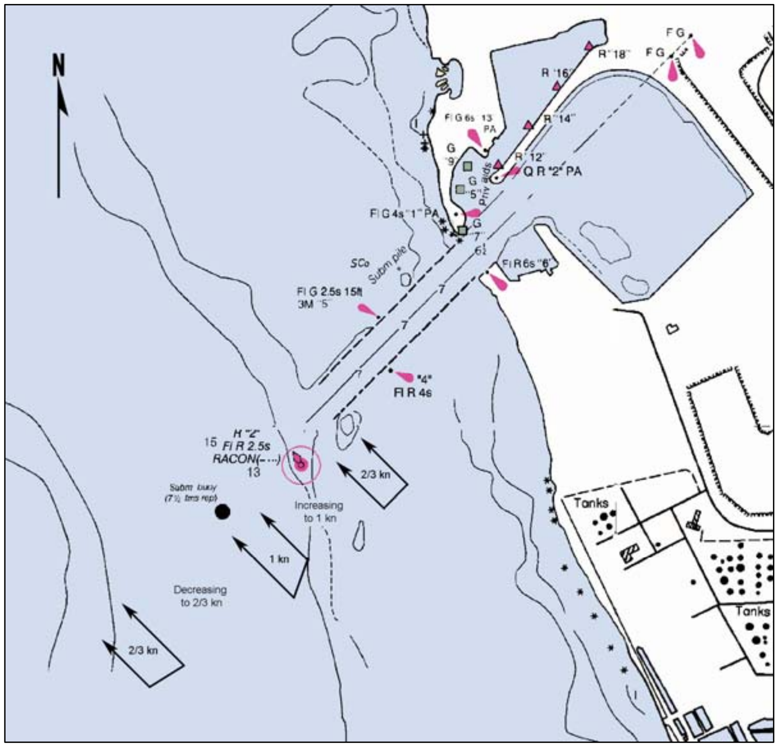


Figure 12. Condition 1 currents.

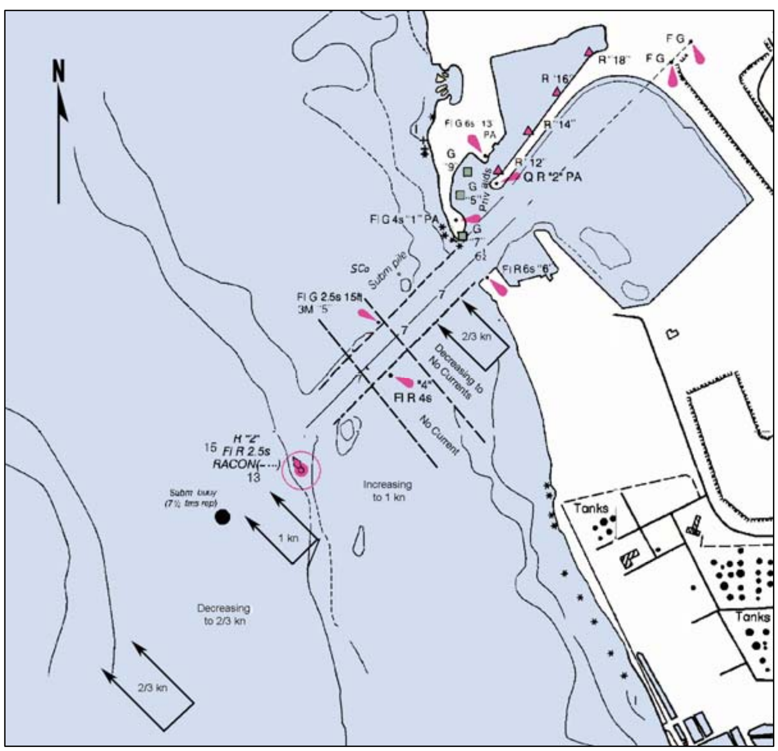


Figure 13. Condition 2 currents.

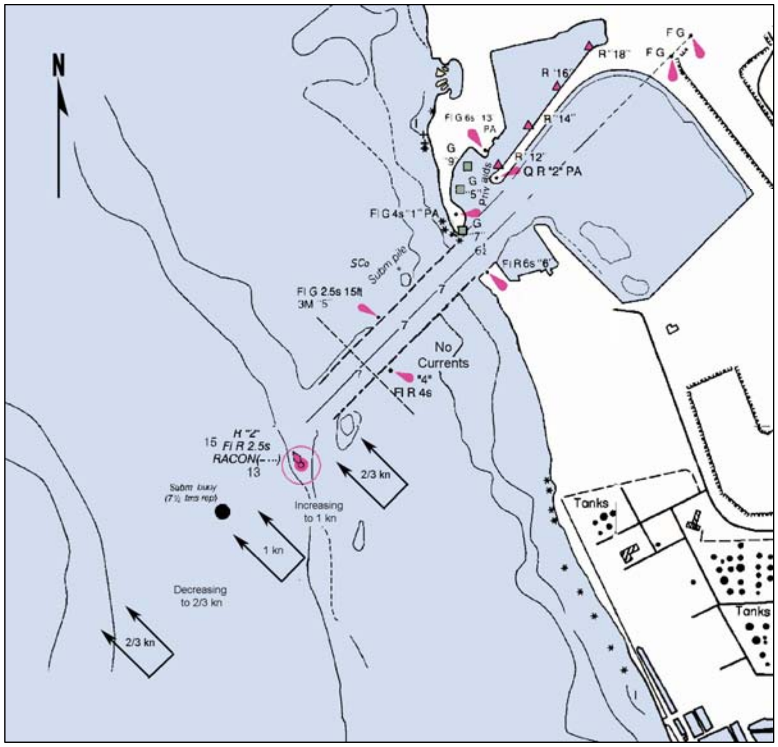


Figure 14. Condition 3 currents.

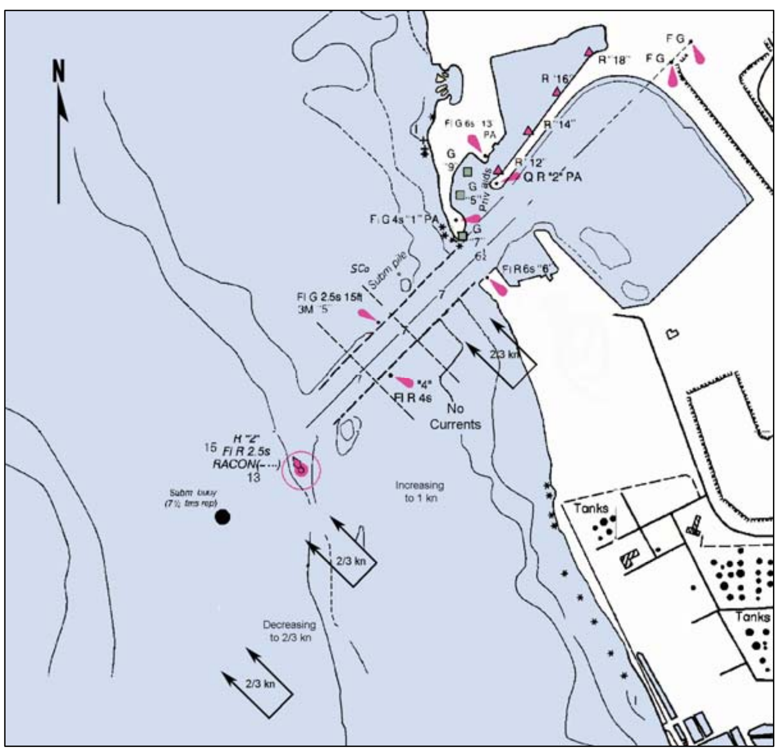


Figure 15. Condition 4 currents.

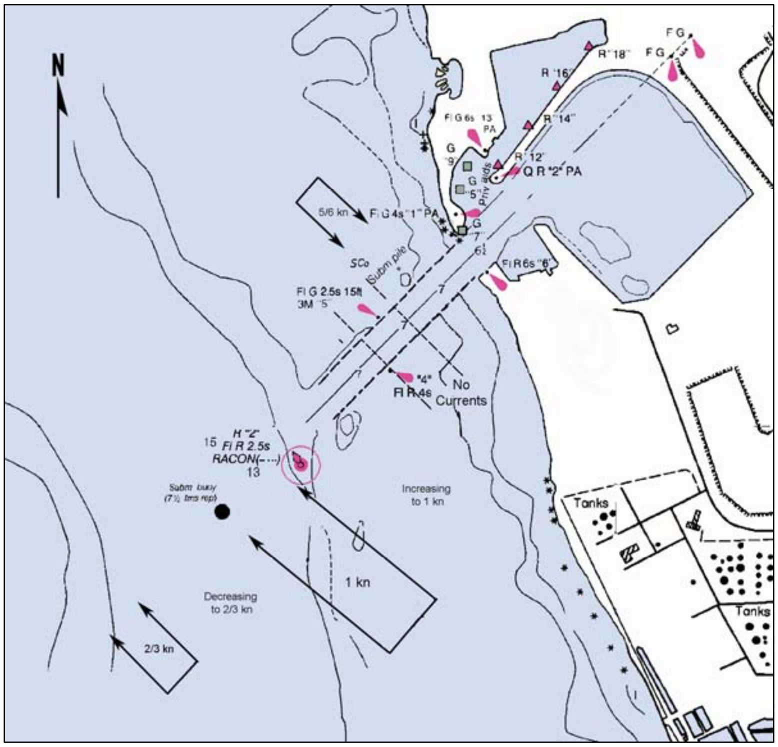


Figure 16. Condition 5 currents.

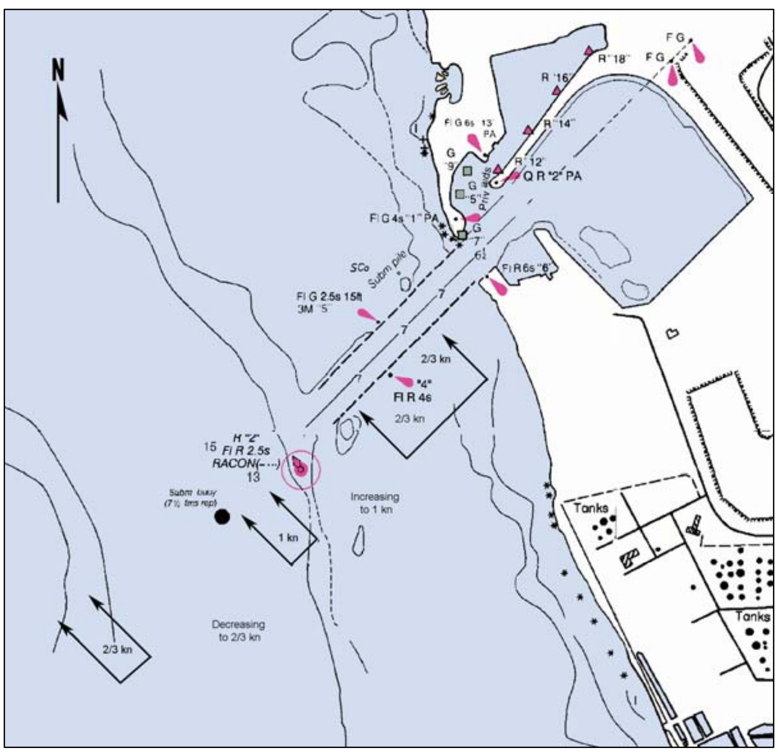


Figure 17. Condition 6 currents.

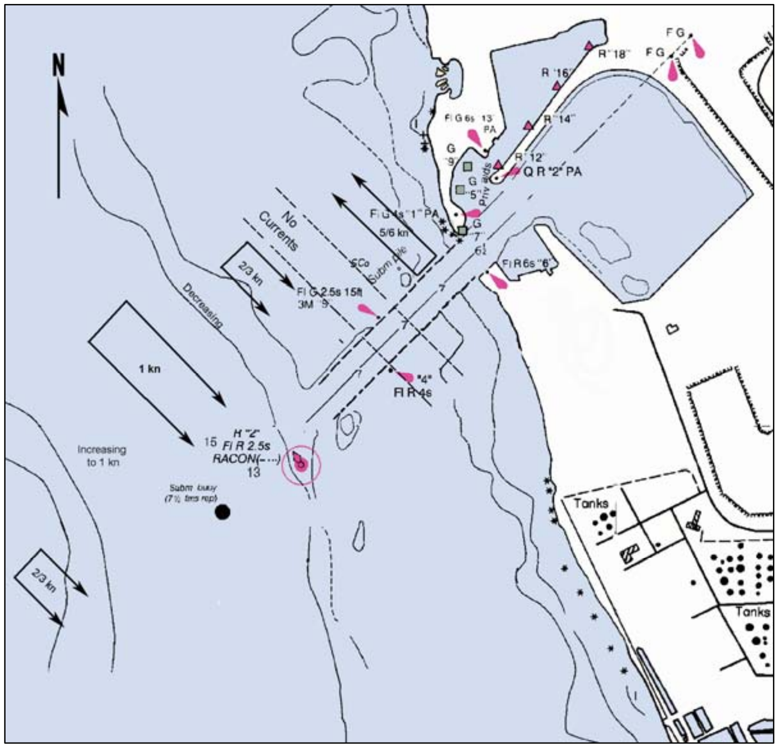


Figure 18. Condition 7 currents.

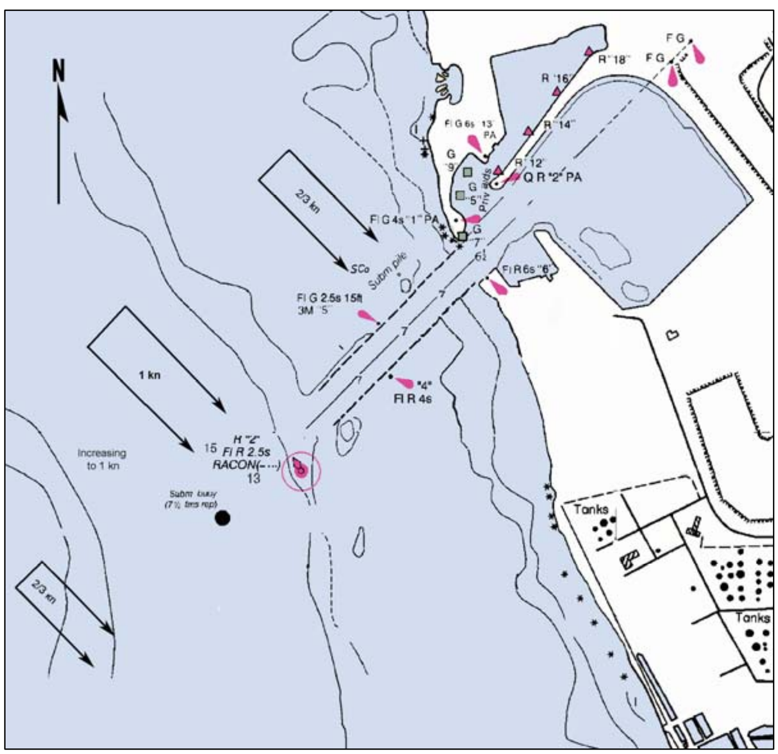


Figure 19. Condition 8 currents.

Once the amount of time per run was determined during validation, an effort to reduce the number of current conditions was made. Care was taken to address as many concerns as possible with the current conditions that remained, with all critical concerns being addresses. Since this reduction was accomplished with only one pilot present, the next set of pilots were also consulted, and the final conditions were agreed upon. These conditions were narrowed down to the ones shown in Figure 20.

For the purposes of this report, and to avoid confusion, the currents were renamed to sequential order, i.e., Condition 1 to Condition 1, Condition 5 to Condition 2, and Condition 8 to Condition 3.

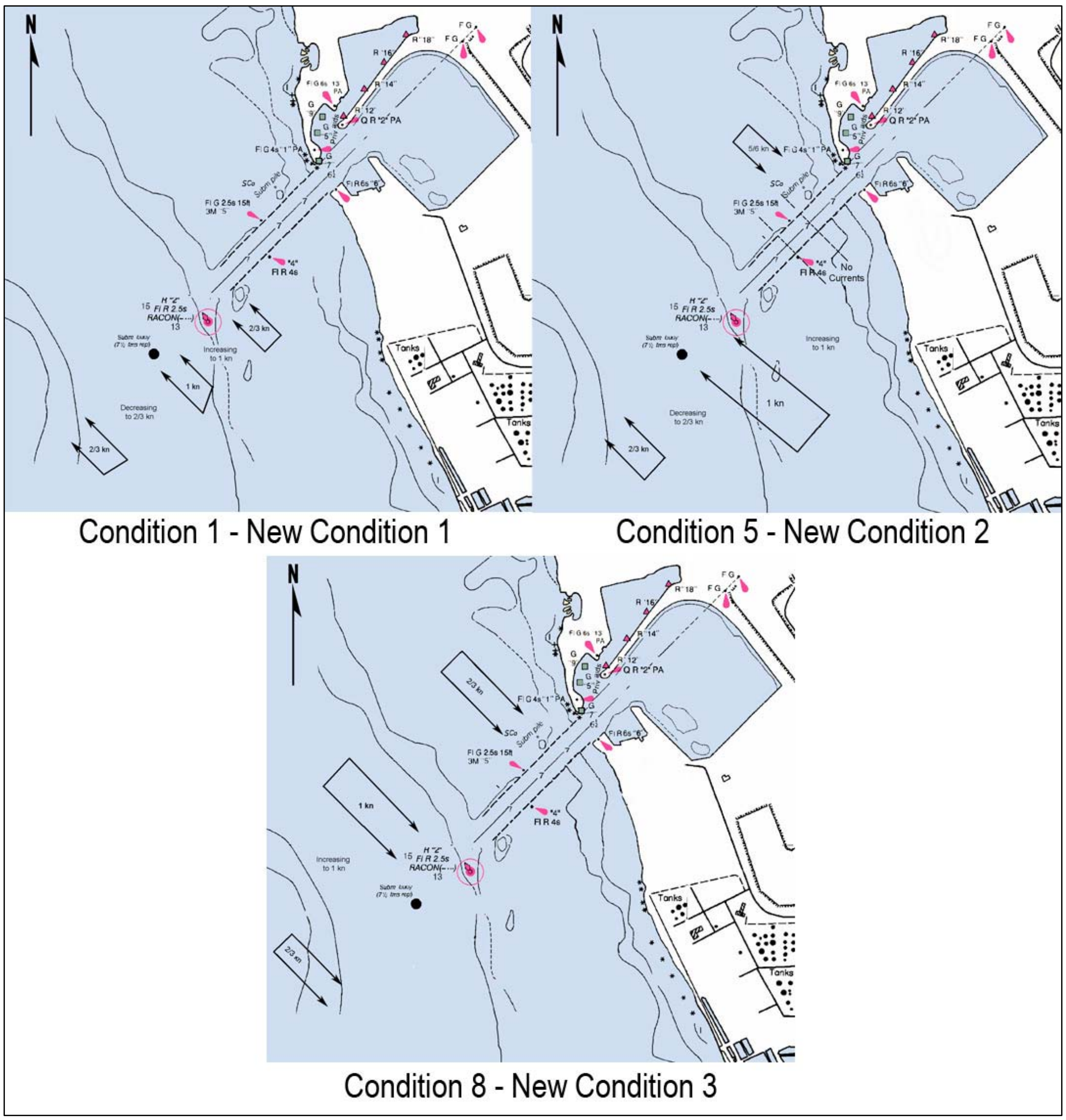


Figure 20. Final current conditions used in testing.

For each of the currents used, possible wave and wind conditions were also analyzed by the pilots, District, DOT-H, and ERDC Coastal and Hydraulics Laboratory (CHL) personnel. The possible conditions for testing during the week of validation are shown in Table 1.

Table 1. Validation testing conditions.

Component	Type	Direction	Speed/Height	Identified on Plates As
Wind	Trade wind	62 deg	20 knots	stated
Wind	SE wind	125 deg	20 knots	stated
Wind	SW wind	225 deg	20 knots	stated
Wind	N wind	0 deg	20 knots	stated
Wind	Calm	NA	NA	stated
Wave	NW swell	315 deg	5 ft	Condition A
Wave	SW wind waves	225 deg	3 ft	Condition B
Wave	SE wind waves	135 deg	3 ft	Condition C
Wave	S swell	180 deg	5 ft	Condition D
Wave	Calm	NA	NA	Condition E

The wind component in the simulator has some variability in strength and direction to approximate natural conditions. It can be set to straight line winds; however, this was not the case for these tests. The wave component remained constant up until the point of entry into the sheltered harbor. On outbound runs the waves began to take effect as the vessel was leaving the harbor. When performing a navigation simulation study, the conditions tested should be environmental conditions during which navigation would still take place, but that test the limits of the design.

During validation it was decided that in Current Condition 2, the 5- to 6-knot current by the harbors entrance did not accurately reflect a realistic extreme. After discussions with the District and the pilots, the current in that section was reduced to 0.5 knot.

3 ERDC Ship/Tow Simulator

A floor plan of the Ship/Tow Simulator is shown in Figure 21.

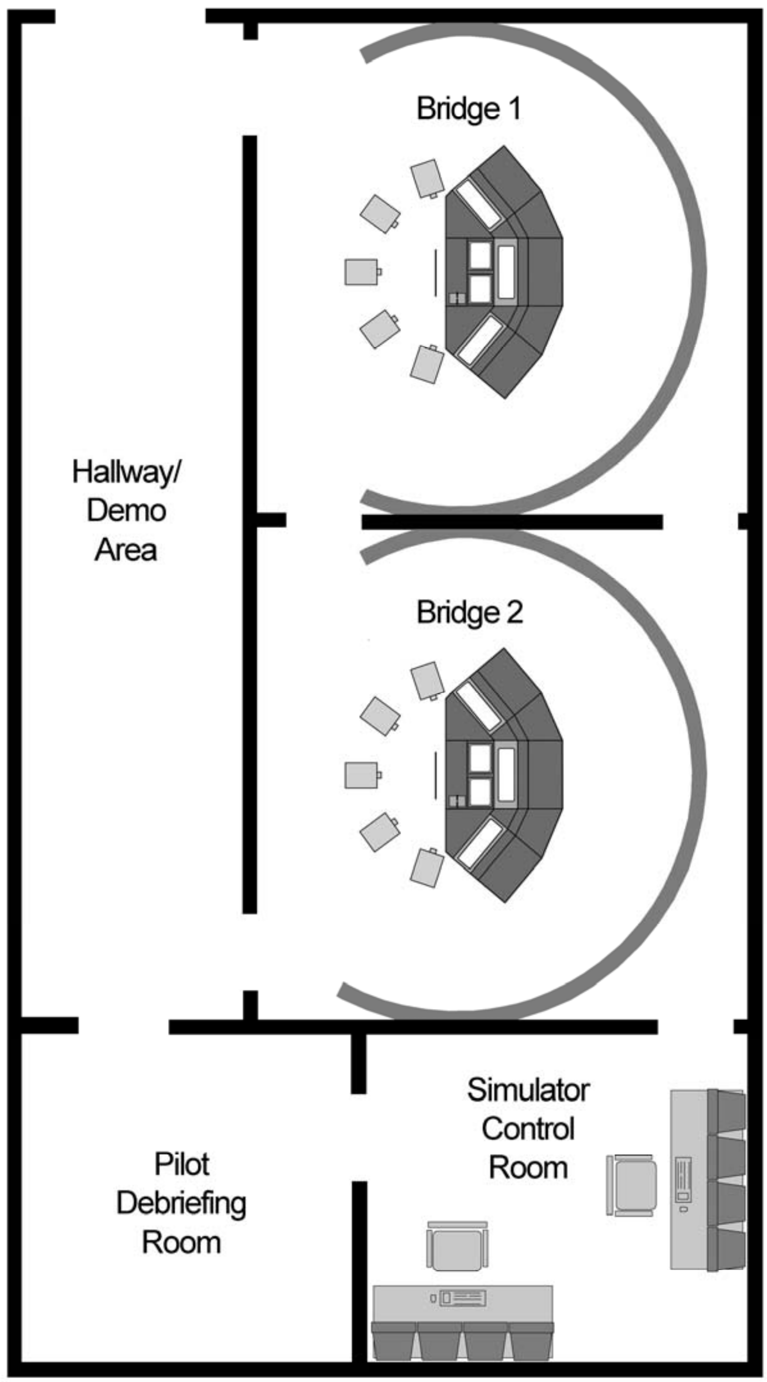


Figure 21. ERDC Ship/Tow Simulator layout.

The simulator is comprised of two bridge modules (Bridge 1 and Bridge 2), a viewing area, a pilot debriefing room, and a simulator operator station (SOS) located in the simulator control room. The bridge module is shown in Figure 22.

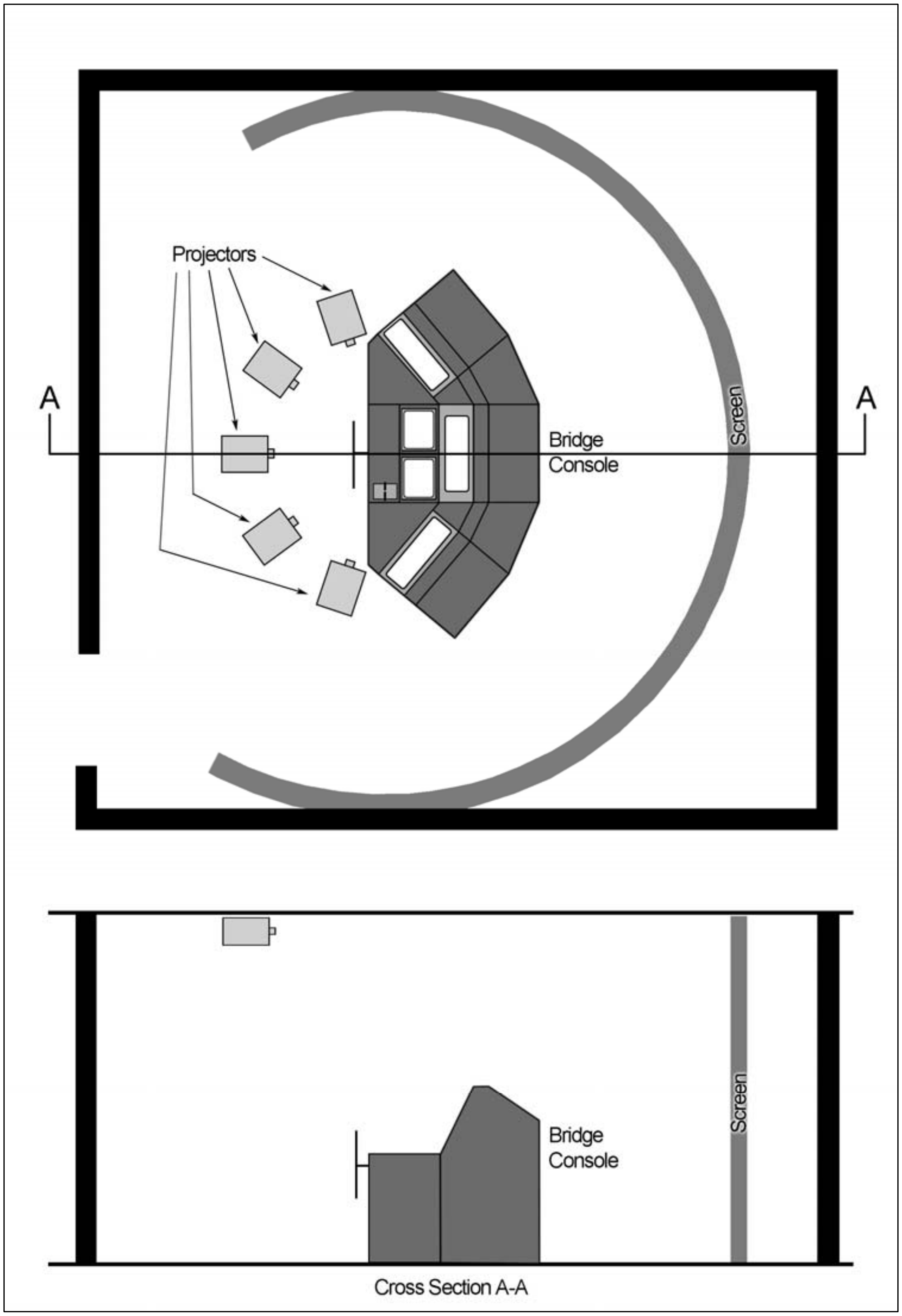


Figure 22. Arrangement of ERDC Ship/Tow Simulator bridge module.

The Ship/Tow Simulator is a “real time” simulator, i.e., ship movements on the simulator require the same amount of time as in real life. Environmental forces such as currents, wind, banks, shallow water, ship-ship interactions, and waves all act upon the vessel during a transit. The pilot controls the simulated vessel’s engine speed and rudder and then sees the effects of his changes depicted on the visual screen and console screens. At regular time intervals, defined by the operator, the vessel’s heading, speed, navigational parameters, etc., are written to an output file and saved for analysis. The time duration of the interval spacing is only limited by the speed of the simulator computer’s processor.

Bridges 1 and 2 can be coupled together for two-way, fully interactive traffic. In that case, the two vessels being used would be visible on the visual scene screen of the other ship, and the hull forces of the opposing ship would affect the handling characteristics of the vessel. In addition to the two-way interactive traffic, the simulator can also be run with “lo-resolution” traffic ships. These ships affect the vessel being piloted, while their handling remains unchanged. This type of traffic ship is controlled from the SOS.

The simulator was used in “stand alone” mode for this study. In this mode, both simulator bridges run independent of each other, with no interaction. If two pilots are participating and “one-way” transits are all that is required, then twice as many runs can be performed during the testing cycle as both simulators are utilized for different tests.

4 Testing Matrix

The matrix in Table 2 was used in the simulation tests for Kalaeloa Barbers Point Harbor.

Table 2. Testing matrix.

Run	Modified Navaids	Current Condition	Ship	Wind Type	Wave Direction/ (SL)-swell, (WW)-wind waves
1	No	1	El Garo	Trade wind	SE/WW
2	No	1	El Garo	Trade wind	S/SL
3	No	1	El Garo	SE wind	SE/WW
4	No	2	El Garo	Trade wind	NW/SL
5	No	2	El Garo	SW wind	SW/WW
6	No	2	El Garo	SW wind	NW/SL
7	No	3	El Garo	Calm	NW/SL
8	No	3	El Garo	Calm	Calm
9	No	3	El Garo	N wind	NW/SL
10	No	2 -outbound	New Amity in ballast	SW wind	NW/SL at Moles
11	No	1	Hayden	Trade wind	SE/WW
12	No	1	Hayden	Trade wind	S/SL
13	No	1	Hayden	SE wind	SE/WW
14	No	2	Hayden	Trade wind	NW/SL
15	No	2	Hayden	SW wind	SW/WW
16	No	2	Hayden	SW wind	NW/SL
17	No	3	Hayden	Calm	NW/SL
18	No	3	Hayden	Calm	Calm
19	Yes	1	El Garo	Trade wind	SE/WW
20	Yes	1	El Garo	Trade wind	S/SL
21	Yes	1	El Garo	SE wind	SE/WW
22	Yes	2	El Garo	Trade wind	NW/SL
23	Yes	2	El Garo	SW wind	SW/WW
24	Yes	2	El Garo	SW wind	NW/SL
25	Yes	3	El Garo	Calm	NW/SL
26	Yes	3	El Garo	Calm	Calm

Run	Modified Navaids	Current Condition	Ship	Wind Type	Wave Direction/ (SL)-swell, (WW)-wind waves
27	Yes	3	El Garo	N wind	NW/SL
28	Yes	2 -outbound	New Amity in ballast	SW wind	NW/SL at Moles
29	Yes	1	Hayden	Trade wind	SE/WW
30	Yes	1	Hayden	Trade wind	S/SL
31	Yes	1	Hayden	SE wind	SE/WW
32	Yes	2	Hayden	Trade wind	NW/SL
33	Yes	2	Hayden	SW wind	SW/WW
34	Yes	2	Hayden	SW wind	NW/SL
35	Yes	3	Hayden	Calm	NW/SL
36	Yes	3	Hayden	Calm	Calm
37	Yes	3	Hayden	N wind	NW/SL

These runs were all carried out with the existing depths in the navigation channel and harbor, as well as the design lighting on the northern shoreline. Tests with more complex conditions were added to the testing schedule later and are not listed on this matrix; those cases will be discussed in the "Results and Conclusions" section of this report.

The ship characteristics used in this study are shown in Table 3.

Table 3. Ship characteristics.

Ship Name	Ship Type	Length Overall, ft	Beam, ft	Draft, ft
El Garo	Bulk carrier	740	106	36
Hayden	Tanker	583	86	36
New Amity	Tanker	810	138	23

5 Results and Conclusions

Results of the navigation study are presented in several forms: trackplots, pilot comments, and pilot ratings. Trackplots show icons for the vessel that convey position and heading at regular time intervals during a test. For the purposes of this study, the time interval used was 30 sec between icons. This interval puts each icon fairly close to the next and gives a good visual representation of the “swept path” that the vessel goes through during maneuvering in the channel and harbor. “Composite” for this report indicates that the runs for all of the pilots testing a particular set of conditions were placed upon a single plate (see Plates 1–81). This composite gives the reader a general feel for the overall effect that an alternative has on the navigational approach that the pilots use on the channel. Pilot comments pertinent to the viability of the design are inset on each plate. If there were no comments made for a particular run, then the inset box will simply state “No Comments.” Because of the complexity of the conditions studied for this project, there are 81 plates of the composite runs; therefore, the plates will be listed separately, and only the effects upon navigation will be discussed in the main body of the report.

The lack of comments for a particular run should not automatically imply that it was good or bad. Pilot ratings rank on a 1 to 10 scale with 1 being the easiest and 10 being the hardest. The ratings for the difficulty of the run will typically be given as an average of all pilot ratings for that test and will be included in the comment inset box. Any rating deviating significantly from the average (at least three increments) will be listed with that pilot’s comments from the run to give an idea of what was occurring during the test. These ratings are intended to give the pilot a way to judge the overall feel of the run, even though the trackplot may not be ideal due to unfamiliarity with the design. With the focus of this study being the viability of nighttime transits, very few runs were made using daylight conditions. However, the daytime runs were done in order to ascertain whether the difficulty ratings associated with the designs were due to the nighttime transit, or if they were in part caused by the design conditions.

The average level of difficulty rating for the existing ranges at night was 8.1. The average difficulty rating for the modified buoys at night was 7.9. The average difficulty rating for the quartering ranges was 7.1. For the runs performed with daylight conditions, the average rating was 3.4. While the difficulty rating dropped for those runs with the modified buoys and quartering ranges for the nighttime runs, there were still groundings, but not as many as with the existing ranges. The pilot's confidence for navigating the channel at night did increase with the quartering ranges; typical statements for quarter range runs were:

- Extra lighting and quartering ranges helped
- Overall, ranges (quartering) made a big difference
- Quartering ranges very helpful

Even with these positive statements, however, it must be noted that the pilots still had problems navigating the channel.

This project marked the first use of quartering ranges by the Ship/Tow Simulator. Although the purpose of quartering ranges is the same as any other range (to assist the pilot in keeping the vessel inside the confines of the channel), the implementation of that purpose is more refined. For those unfamiliar with this type of range system, the side-to-side position of the vessel within the channel can be determined with greater accuracy than a single set of centerline ranges. Figure 23 shows the positions of the vessel making an inbound approach that would give the pilot the view of the quartering ranges shown in Figure 24. The ability to more quickly ascertain what the vessel is doing within the channel as well as where it is in the channel is imperative to safe operation when the channel is as short and confined as Kalaeloa Barbers Point Harbor's channel. The quartering ranges enhance that ability because a slight deviation from the center of the channel is more pronounced when comparing the distances between the two outside ranges.

The 7.1 for the quartering ranges is still an above average difficulty rating. These ratings are in large part due to the fact that the pilots do not now take ships into the harbor at night and are therefore unfamiliar with nighttime transits. For this reason the project was unusual in that the existing conditions are not really the normal existing conditions. Normal for this harbor are daylight transits. However, to compare the daylight transits with the nighttime runs would distort the results for the changes to the navigation aids. One other note is that until the last set of tests, the geometry of the channel does not change from the current conditions. This means that the same problems are there for each set of runs, the only

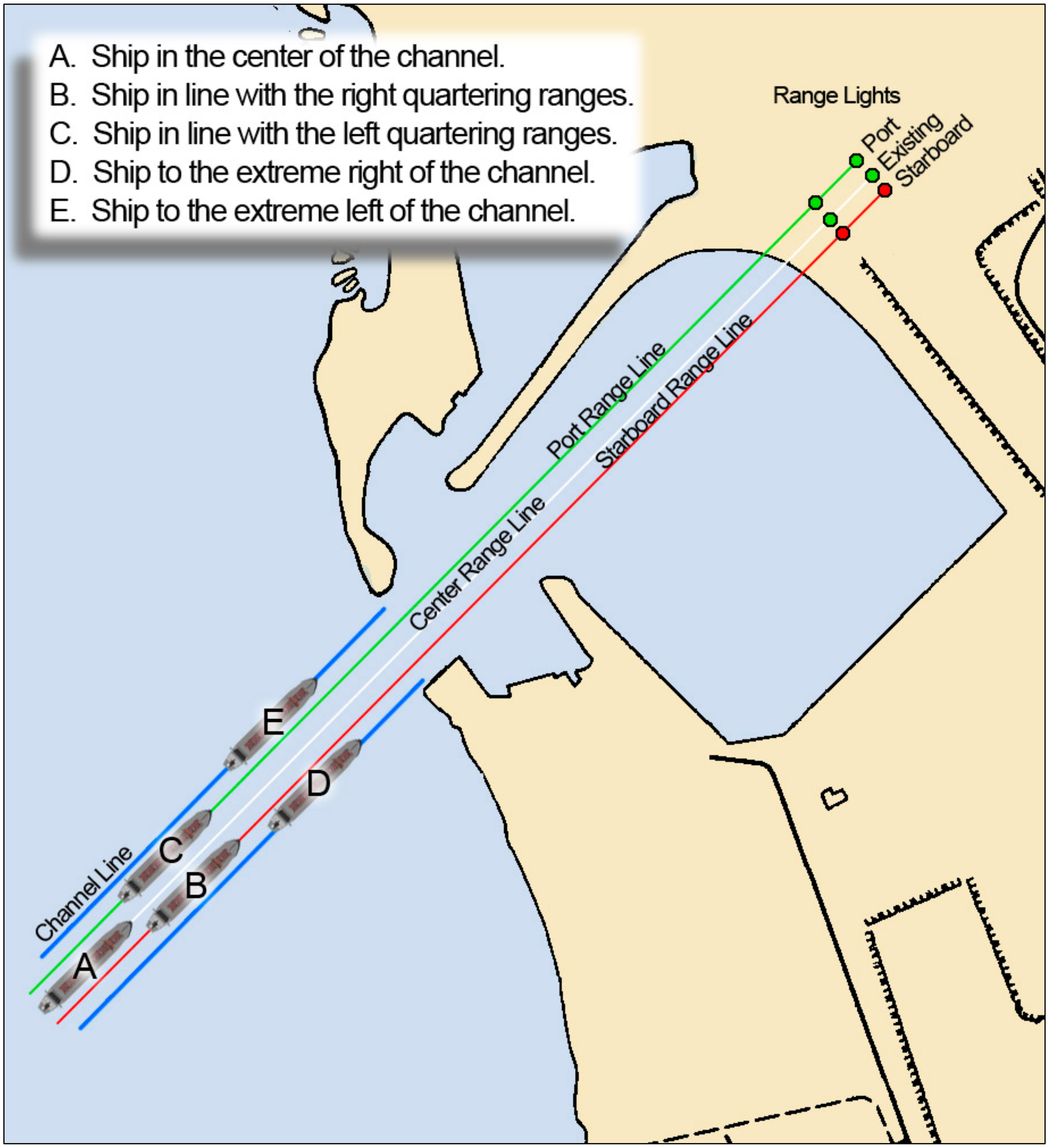


Figure 23. Linear ship position in channel for range viewpoint on Figure 28.

difference being the tools available to try to solve those problems, i.e., the modified navigational aids. For this reason, composite trackplots do not show as many differences between test and existing conditions as a normal project might, and the pilot's experience and point of view come into play even more.

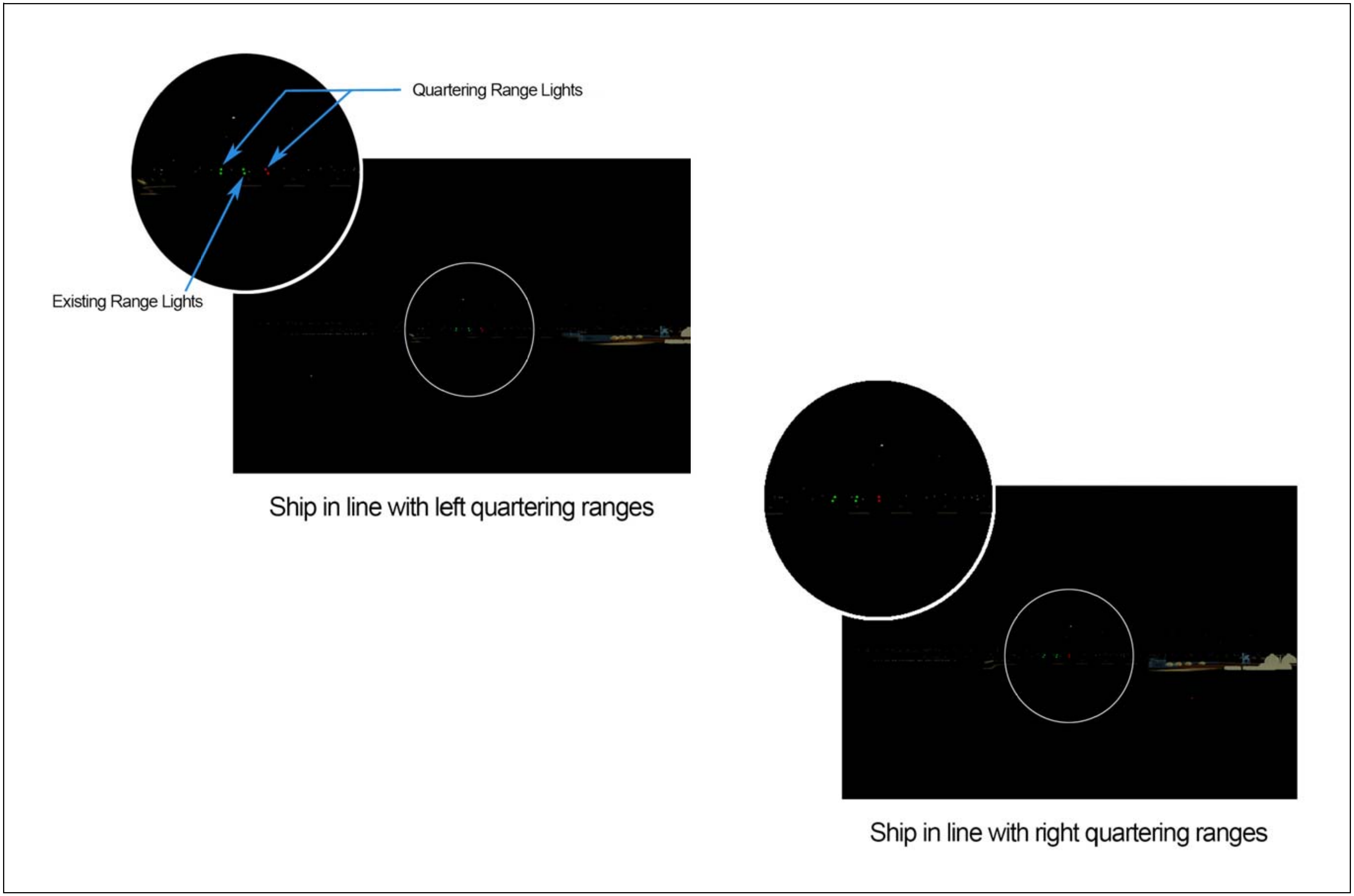


Figure 24. Kalaeloa Barbers Point Harbor with quartering ranges in place, ship at entrance to channel (Continued).

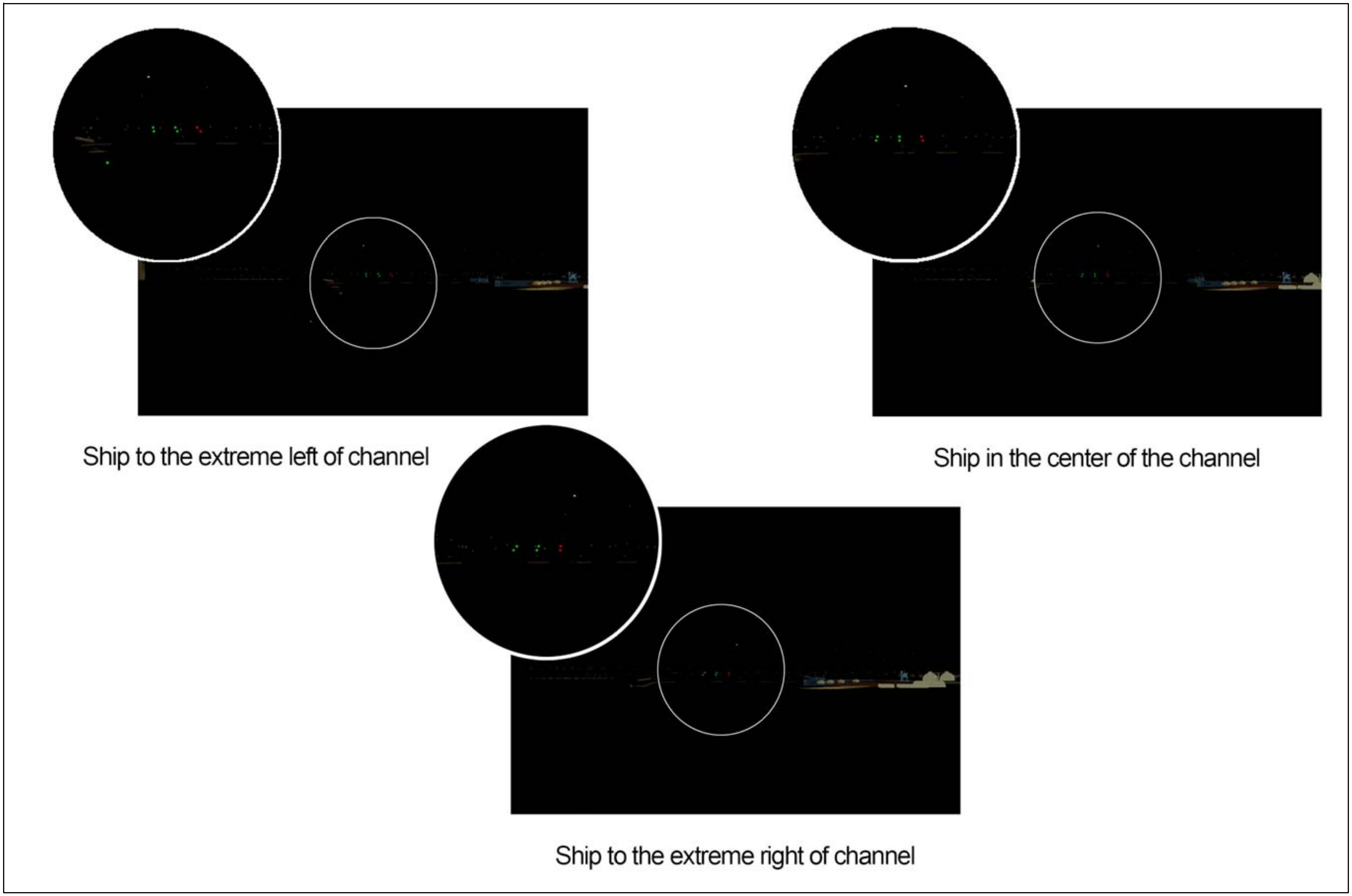


Figure 24. (Concluded).

Whether daytime or nighttime runs are being tested, the forces acting upon the ship remain the same. Generally, wind forces were a significant factor only in the outbound runs, when the vessels were carrying a light load. The reason for this can easily be shown with Figure 25.

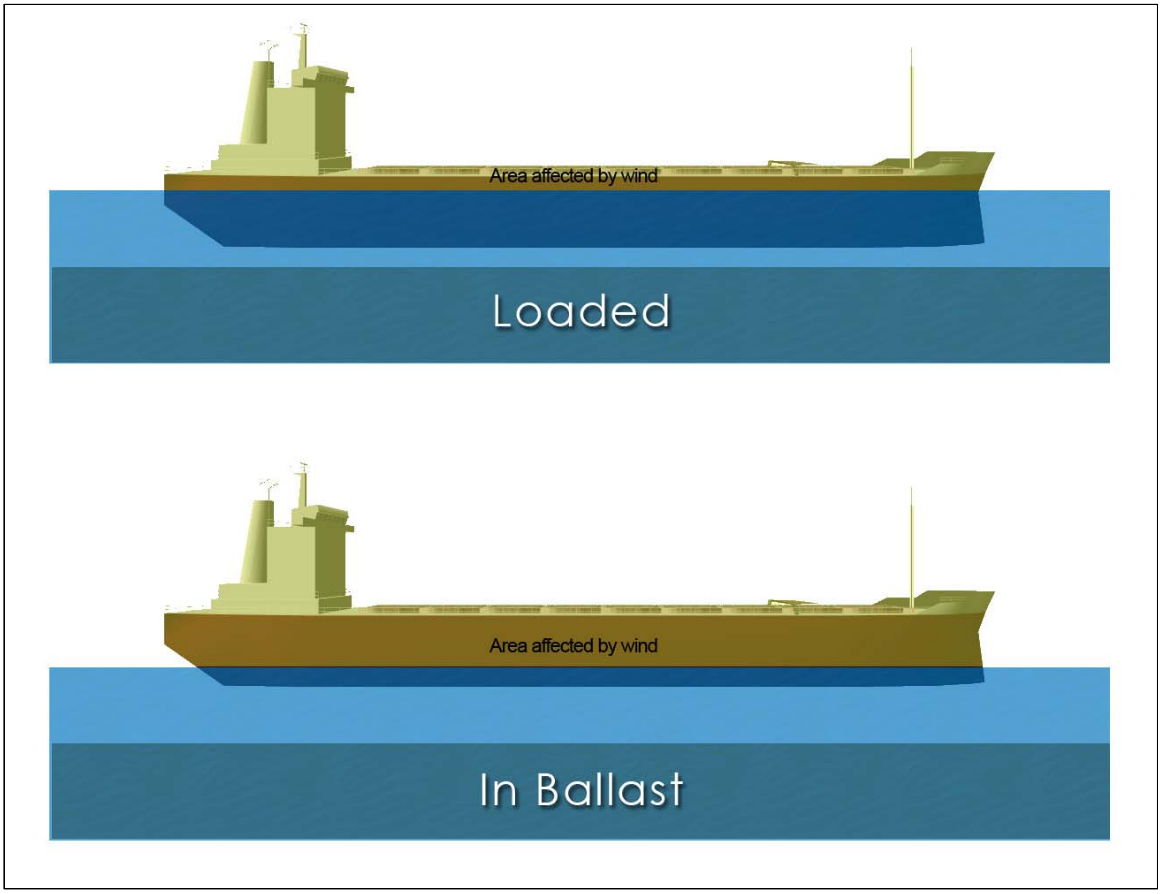


Figure 25. Difference in freeboard area (i.e., "sail area") affected by wind between a loaded tanker and a tanker in ballast.

The longitudinal cross-section area that the wind can act upon is greatly reduced when the ship is loaded. In addition, the mass of the vessel is greatly increased, making it harder to deviate it from its path. In addition, unlike the graphic above, a ballasted ship does not normally sit on an even keel, making the wind force action uneven from the bow to the stern.

Unlike wind forces, the opposite is true for the bank forces and currents acting upon the vessel, as shown in Figure 26.

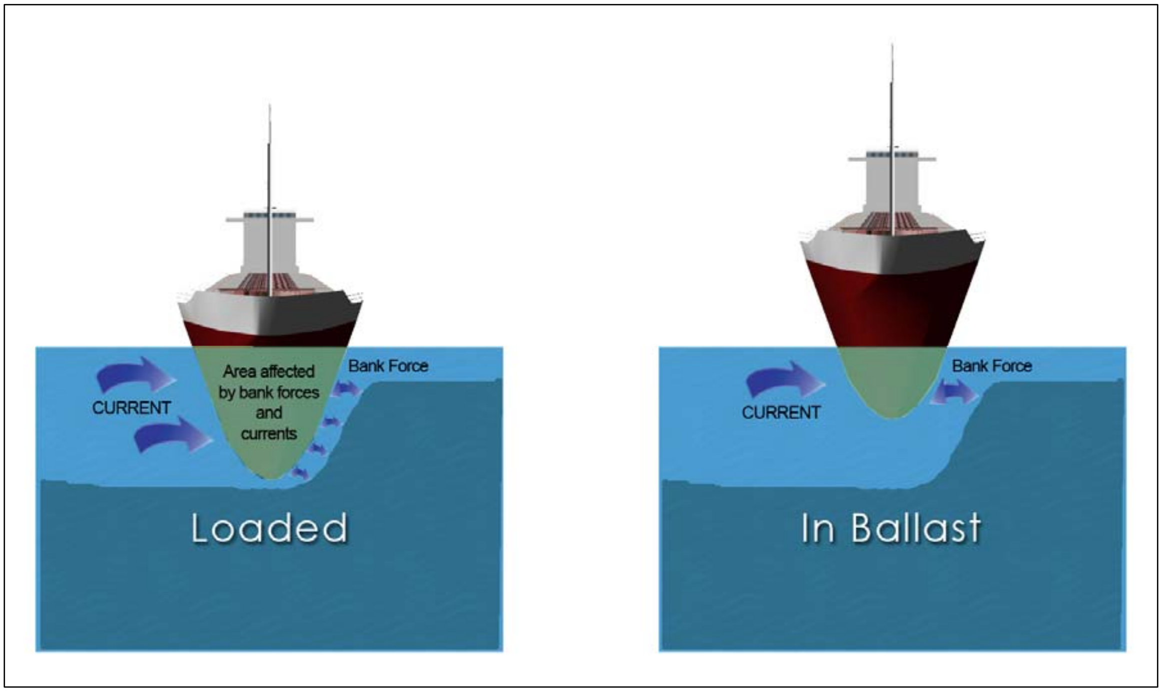


Figure 26. Difference in current and bank force areas of influence.

The effect of waves upon the vessel's maneuverability is inversely linked to its mass. Therefore, even though the waves affect both the loaded and light loaded vessels, it is the vessel with the shallowest draft (the one that has less mass) that is typically affected the most for a particular type and size of ship.

The pilot must deal with all of these forces working together on the vessel as it approaches or exits the harbor. He will be able to ascertain the wind and wave conditions in the area easily during daylight. However, he will not know how the currents in the area are acting, although he may get a general idea from someone who has just left the area. He will also have to compensate for the vessel's handling characteristics, generally unknown unless he has piloted the ship several times in the past. All of these conditions are much more "readable" during daylight; it is the changes between the daytime and nighttime transits that drive this navigation study. Daytime visual cues help the pilot decide what the currents in the channel are doing as the vessel is affected by them; these cues are almost nonexistent at night. The installation of one or two buoys with the capability of transmitting current data (i.e., data buoys) to a location that the pilot could have access to would remove this unknown factor. While these buoys would certainly be invaluable even for daytime transits, their addition would be a major step forward towards the safety of nighttime runs. It is fairly easy to overlook the lack of current data at first as being a problem for the pilot; one would assume that the Hawaii pilots have all of the devices at their disposal as other pilot groups. However, it must be understood that, while rivers are somewhat constant in the current patterns, and many harbors located in estuaries have currents that are tidally driven and therefore fairly predictable with the tide charts, Kalaeloa Barbers Point Harbor is neither. In fact there are times that the wind-generated waves may be going opposite the currents in the channel. The pilot cannot rely solely on visual cues for the crosscurrent patterns, and therefore, does not know what to expect until the ship is within the influence of the current.

The implementation of these data buoys for simulation purposes was a simple matter of informing the pilot of the current conditions inside the start of the channel and before the entrance of the harbor at the beginning of the run. This is a realistic depiction of how they would work during a transit. The data buoys, once in place at the channel, would send a data stream to a facility where the pilots could call or log in and receive up-to-date current information before entrance into or departure from the harbor.

In addition to the data buoys, the other improvement for inbound nighttime transits would be the addition of quartering range lights, as mentioned earlier in this report.

Due to circumstances at the time of their construction, the existing ranges are fairly close together; this makes it more difficult to see relatively small errors in alignment. A greater differential in elevation between the front and rear range light would help increase the error sensitivity. Also, the rear range light is on a 7-sec cycle. During the nighttime runs, since very few other visual cues were available, this left the pilot waiting for the range light to come back on so he could tell the vessel's placement in the channel.

The design modification primarily studied for outbound runs was the addition of a new gated set of buoys. There is no feasible way to place ranges for the outbound transit, and the inbound ranges are too close to be of much value. However, buoys can, in a limited way, be used as ranges as well as marking the channel limits. The addition of a new gated pair of buoys between the two at the entrance ("6" and "7") and "4" and "5"

(Figure 27), as well as moving "5" into a gated position with "4," would improve the ability of the pilot to determine where he needs to be as he picks up speed outbound, before he is affected by crosscurrents and waves.

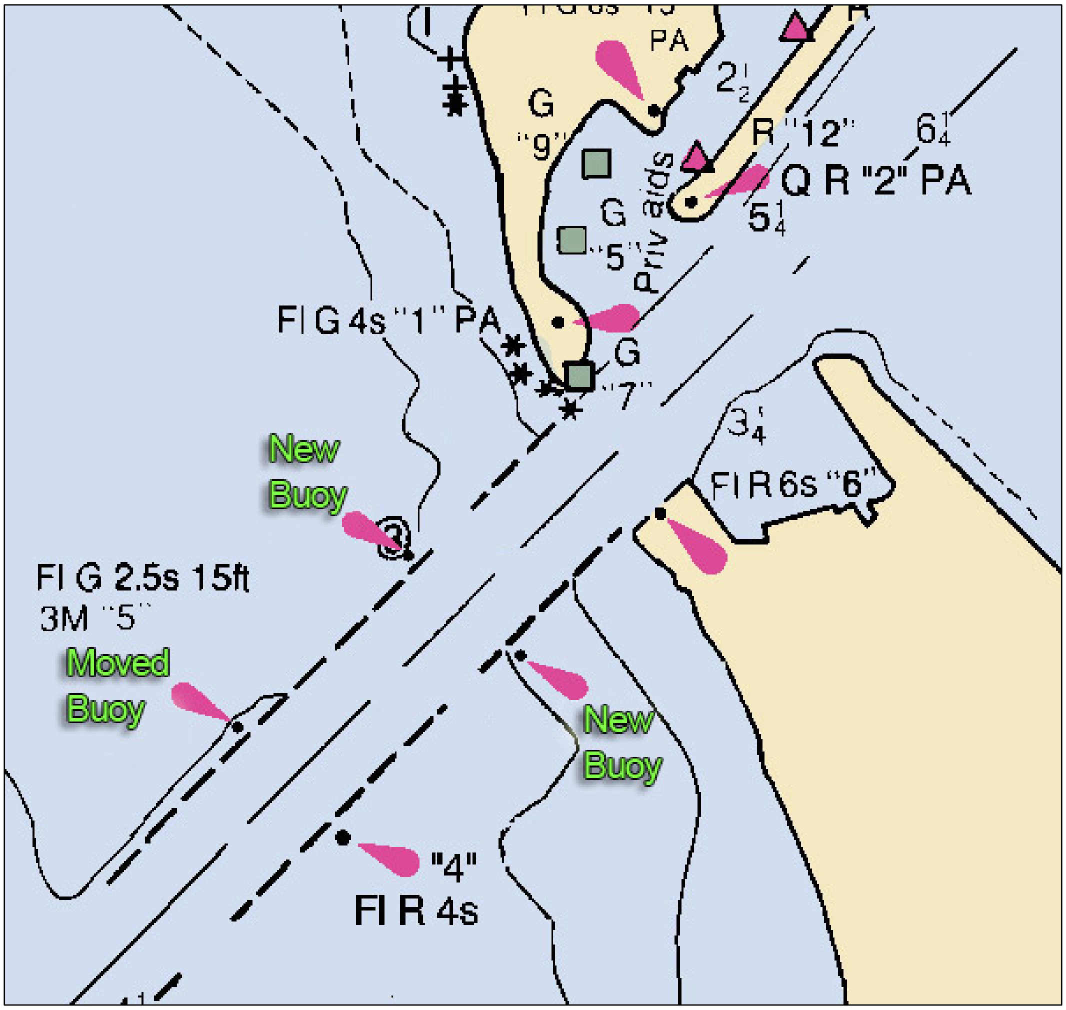


Figure 27. Proposed new and modified buoy location.

The last part of this study analyzed the effects of a 375-ft jetty extending from the northwestern corner of the harbor entrance (Figure 28). This jetty was tested in the physical model study completed in Sept. 1994. The jetty served to remove and/or reduce wave forces and current forces acting on the vessel as it enters the harbor, thus giving the pilot more time to set up his approach and lower his speed.

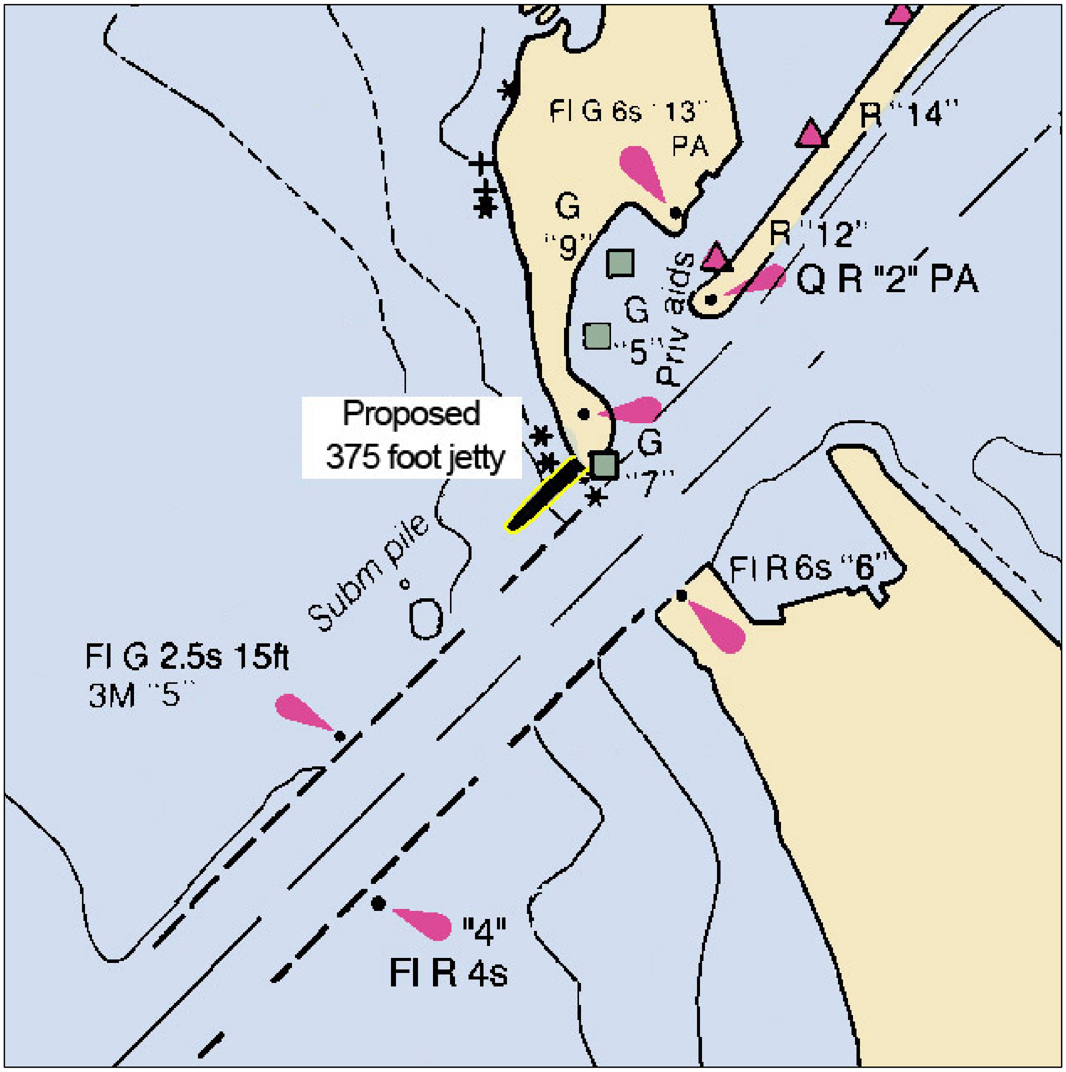


Figure 28. Proposed jetty at harbor entrance.

While the jetty does not afford any protection from the wind, it does provide shelter from currents and waves. These findings are discussed in Briggs et al. (1994). The jetty does provide an improvement in navigation conditions near the entrance to the harbor. The greatest benefit is to the outbound light loaded vessels, allowing them to pick up more speed coming out of the harbor before being fully influenced by the waves and current.

The results indicate that modifications to the existing navaids will need to be made. Since the U.S. Coast Guard is responsible for channel marking, they should be furnished a copy of this report to initiate discussions on the best plan of action to introduce nighttime transits into the harbor. Of the changes in buoys, the addition of the data buoys that would enable the pilot to find out what the current and crosscurrents are doing would be the most advantageous, while the addition of new gated buoys would be an improvement that could possibly be accomplished at the same time the data buoys are added.

The changes to the shoreline lighting were somewhat effective, with the greatest advantage coming when the ships were close to shore and maneuvering. Much of the time, lighting close to the shoreline can be obscured by the vessel itself. The view from the ship's main bridge can be limited when looking forward towards the waterline (Figure 29) or even to the side (Figure 30).

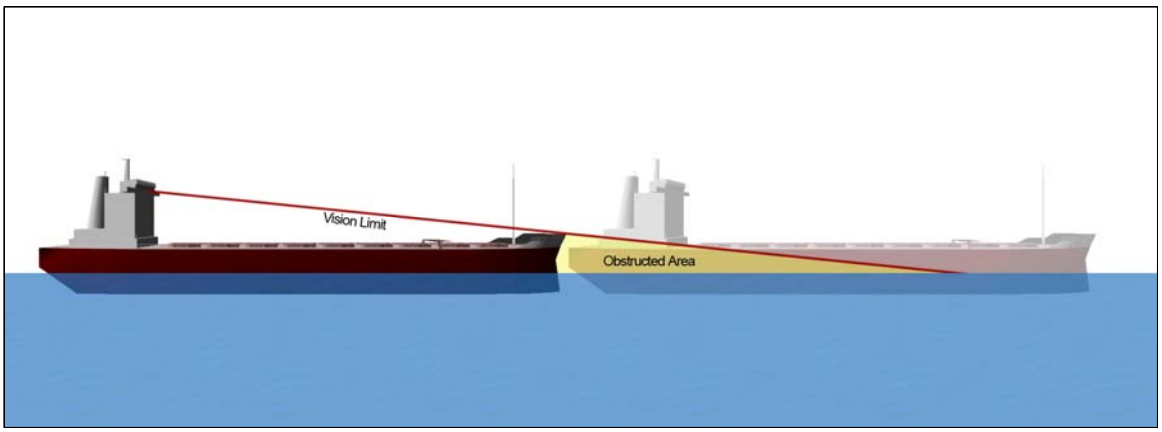


Figure 29. Obstructed view looking forward.

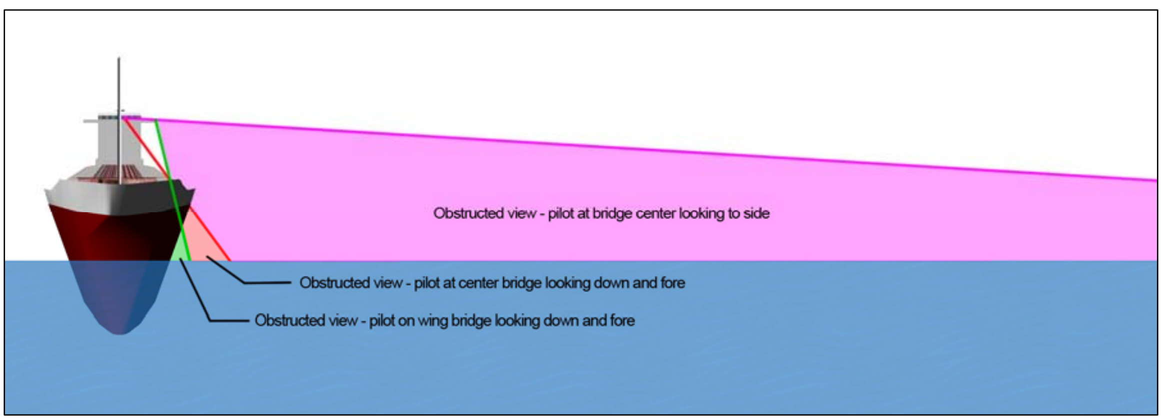


Figure 30. Pilot's view to the side of the vessel.

Because of this limited view, docking maneuvers almost always require the pilot to walk out on the wing and look over the side to determine what the vessel is doing. Depending upon the vessel type, the bow can obscure the length of the vessel or more. Although this problem is something that pilots deal with on a continual basis and have learned to compensate for, the fact remains that elevated ranges and navaids that are still some distance away are better indicators of ship position and attitude for the pilot as the vessel approaches the harbor. Once inside the harbor, the shoreline/terminal lights would provide some assistance for the tugs and/or ship.

6 Summary

The pilots' main concern during these tests was their ability to determine the ship's position during nighttime transits in order to prevent casualties. The modifications studied included:

1. The new lighting to be added for the harbor improvements alone did not provide enough visual cues for the pilot's entrance into the harbor to decrease the risk of casualties. Once inside the harbor, these additional lights would provide guidance for docking the ship.
2. For entrance to the harbor, the addition of data buoys (or replacement of existing buoys) and quartering ranges provided the most beneficial information to the pilots. The quartering ranges would enable the pilots to determine their location in the channel to a greater degree of accuracy than the existing single range. The data buoys would provide the current information before the approach to the harbor.
3. For departure from the harbor, the addition of an extra gated pair of buoys, and the relocation of buoy "5" (Figure 27), did improve the ability of the pilot to determine the vessel location during the transit.
4. The addition of the jetty and the subsequent increased length of the protected entrance reach into the harbor simplified currents at the harbor entrance, and thereby eased the departure from the harbor by protecting the ship from crosscurrents as the ship builds speed.

At the end of the testing program, as well as during the runs themselves, the pilots maintained the infeasibility of nighttime transits into Kalaeloa Barbers Point Harbor for vessels of the size tested in this study (over 500 ft length overall). Even with the changes made during testing, the pilots were not totally comfortable with the resulting transit conditions. Improving the feasibility of nighttime transits of large vessels into and out of this harbor has to begin with improving the existing system of navigational aids. Subsequently, the pilots would start with smaller vessels that they would be comfortable navigating into and out of the harbor, then expand the range of viable ships as experience and knowledge dictate.

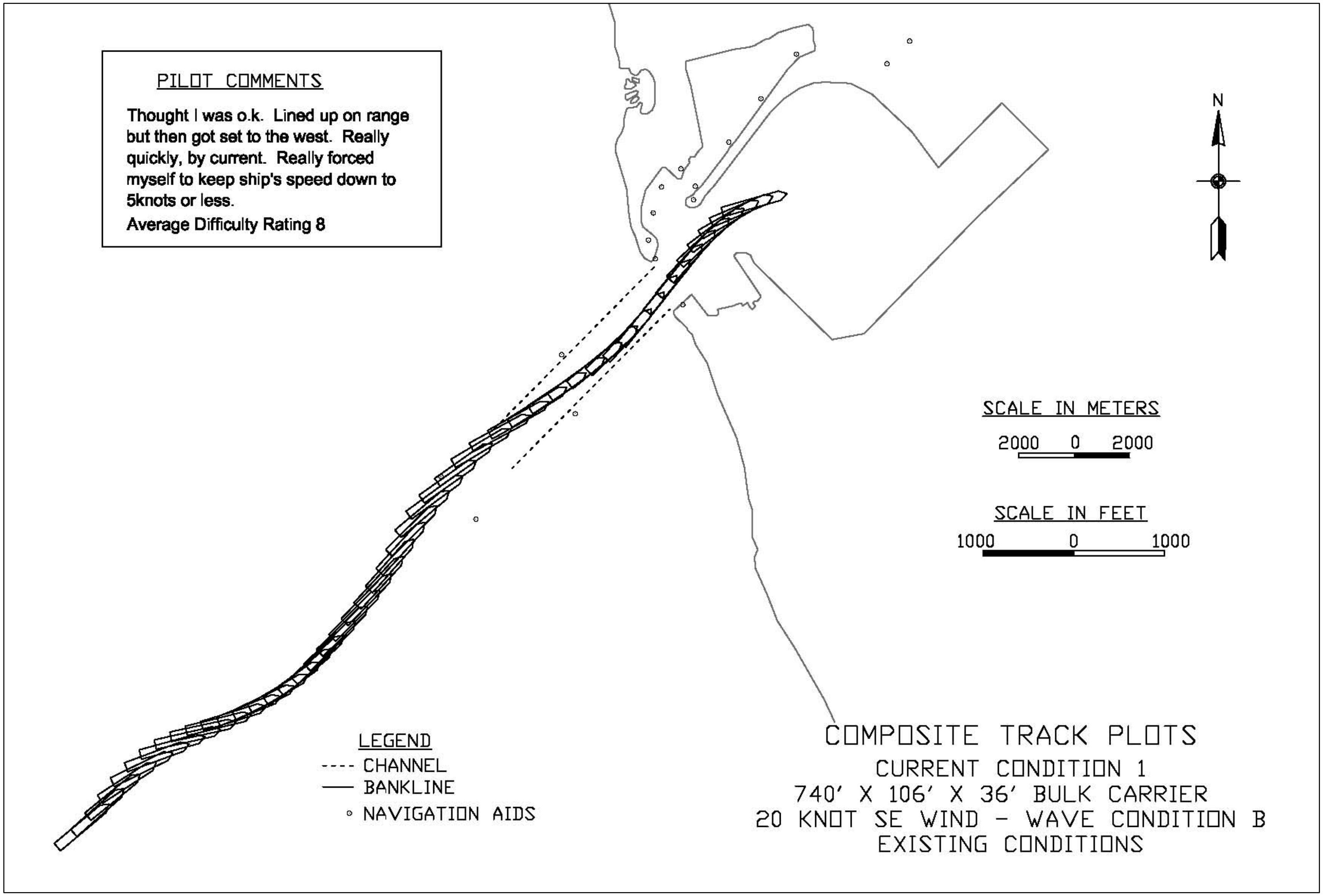
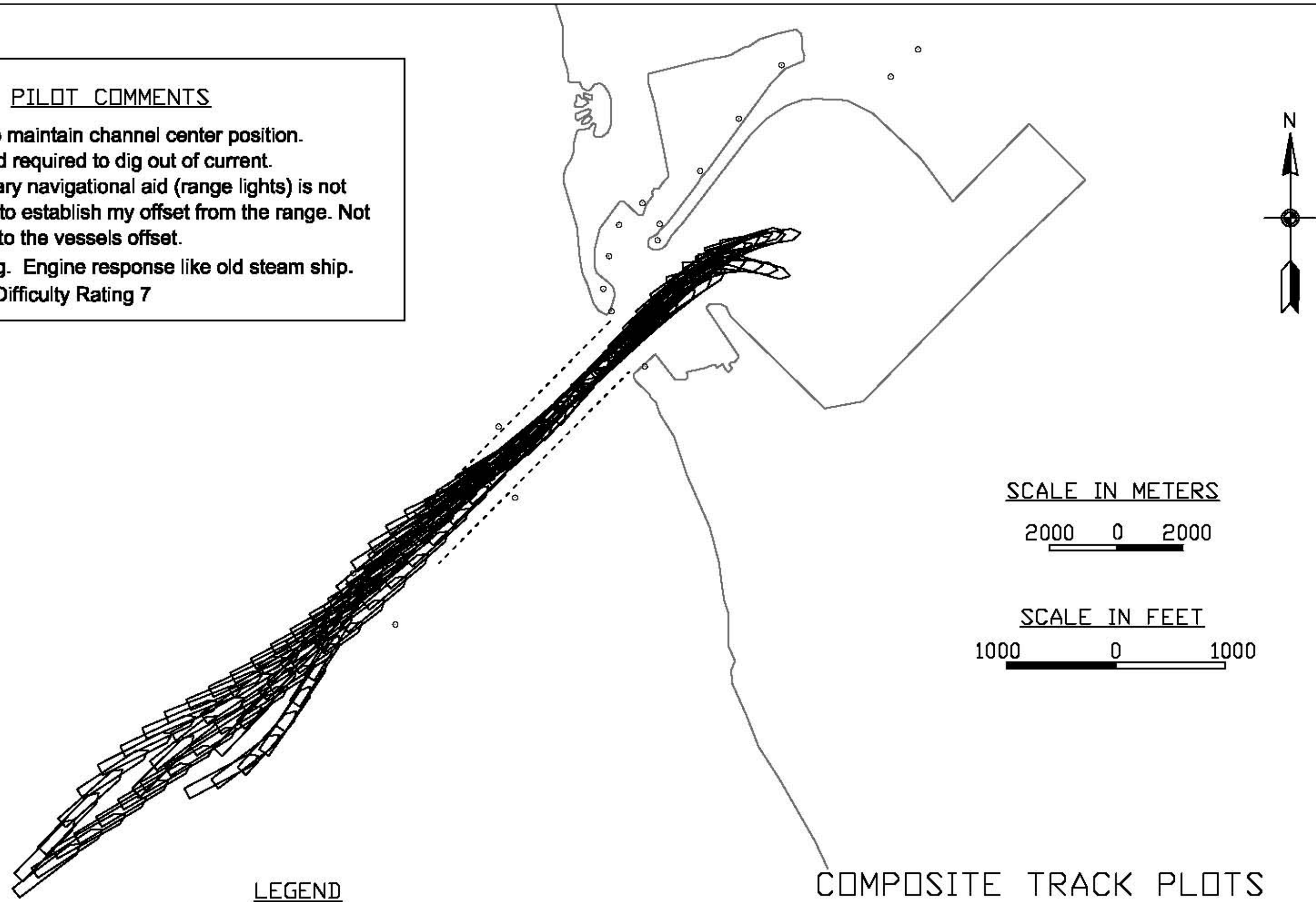

PILOT COMMENTS
Thought I was o.k. Lined up on range but then got set to the west. Really quickly, by current. Really forced myself to keep ship's speed down to 5knots or less.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT SE WIND - WAVE CONDITION B
EXISTING CONDITIONS

Plate 1

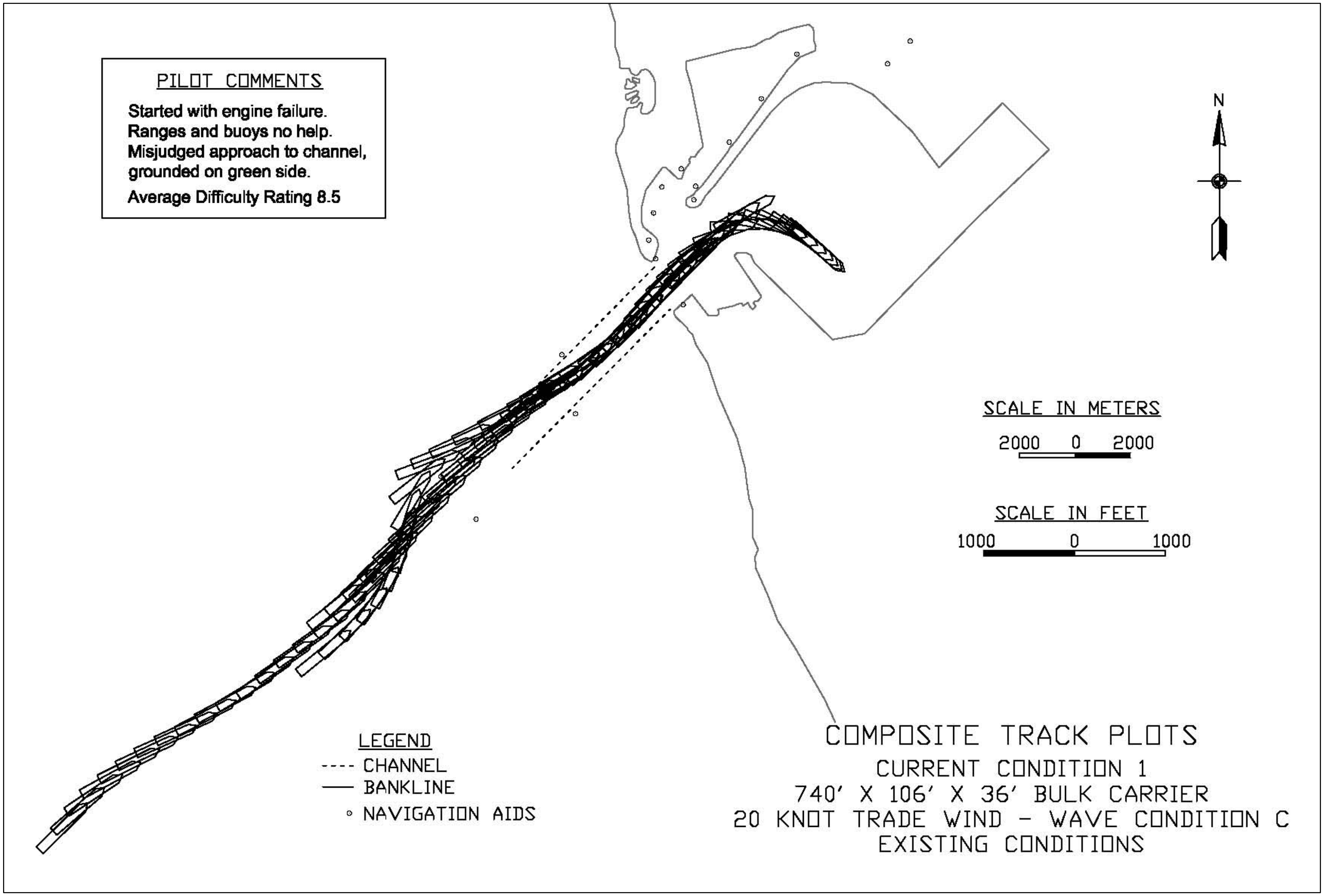
PILOT COMMENTS

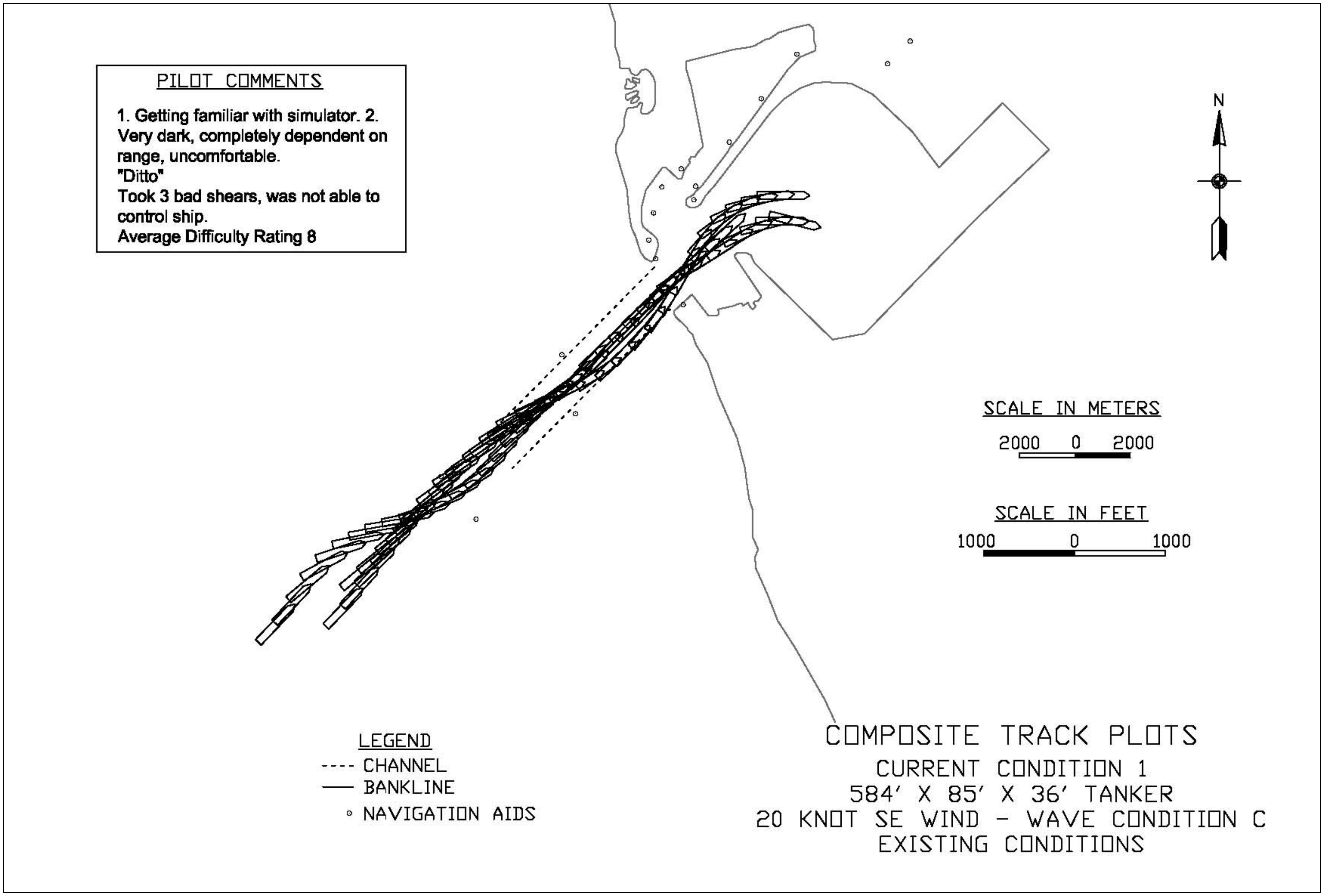
Difficult to maintain channel center position.
Full ahead required to dig out of current.
The primary navigational aid (range lights) is not sufficient to establish my offset from the range. Not sensitive to the vessels offset.
Range n.g. Engine response like old steam ship.
Average Difficulty Rating 7



LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS

COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT SE WIND - WAVE CONDITION C
EXISTING CONDITIONS


PILOT COMMENTS
Started with engine failure.
Ranges and buoys no help.
Misjudged approach to channel, grounded on green side.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION C
EXISTING CONDITIONS


PILOT COMMENTS
1. Getting familiar with simulator. 2. Very dark, completely dependent on range, uncomfortable.
"Ditto"
Took 3 bad shears, was not able to control ship.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584' X 85' X 36' TANKER
20 KNOT SE WIND - WAVE CONDITION C
EXISTING CONDITIONS

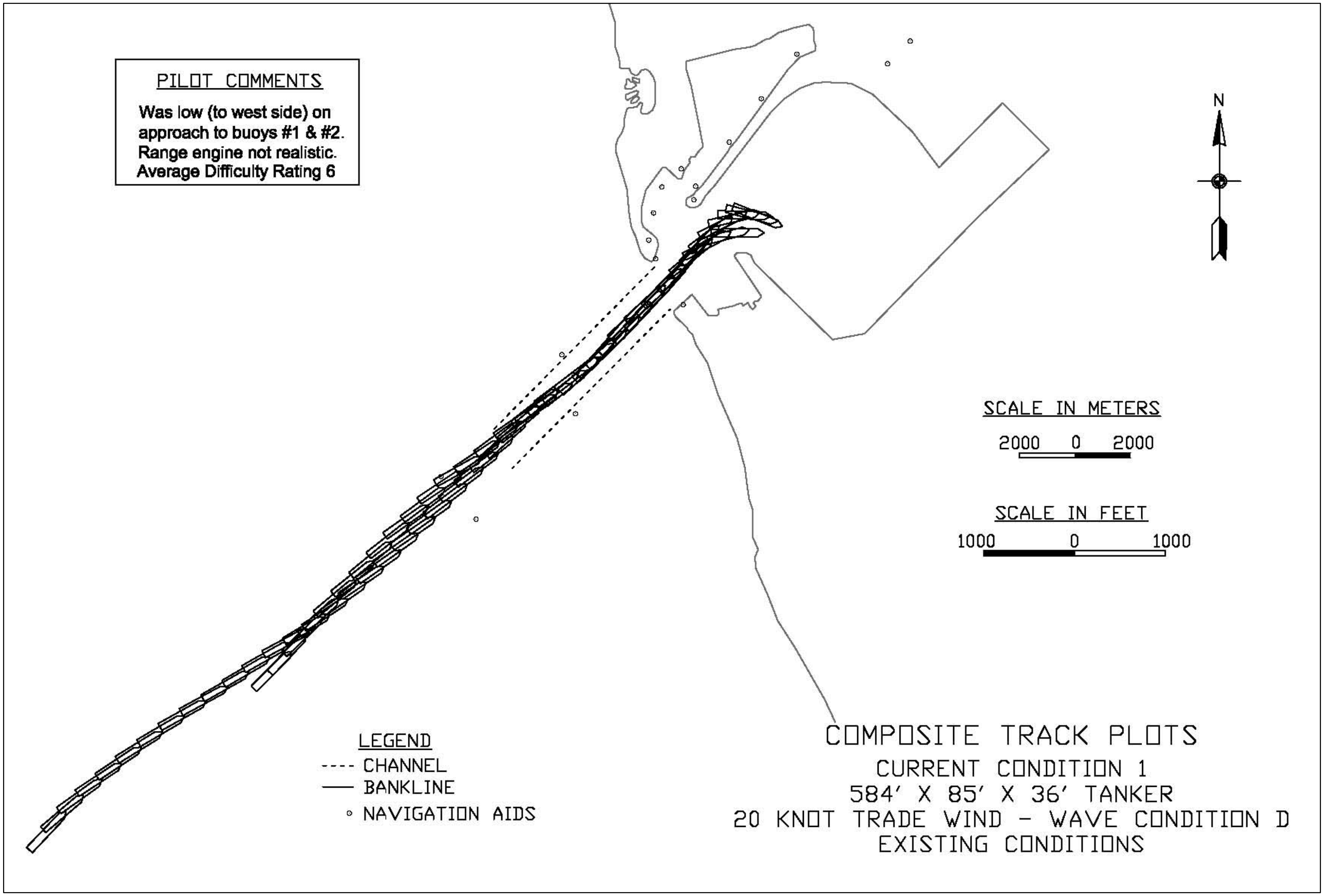
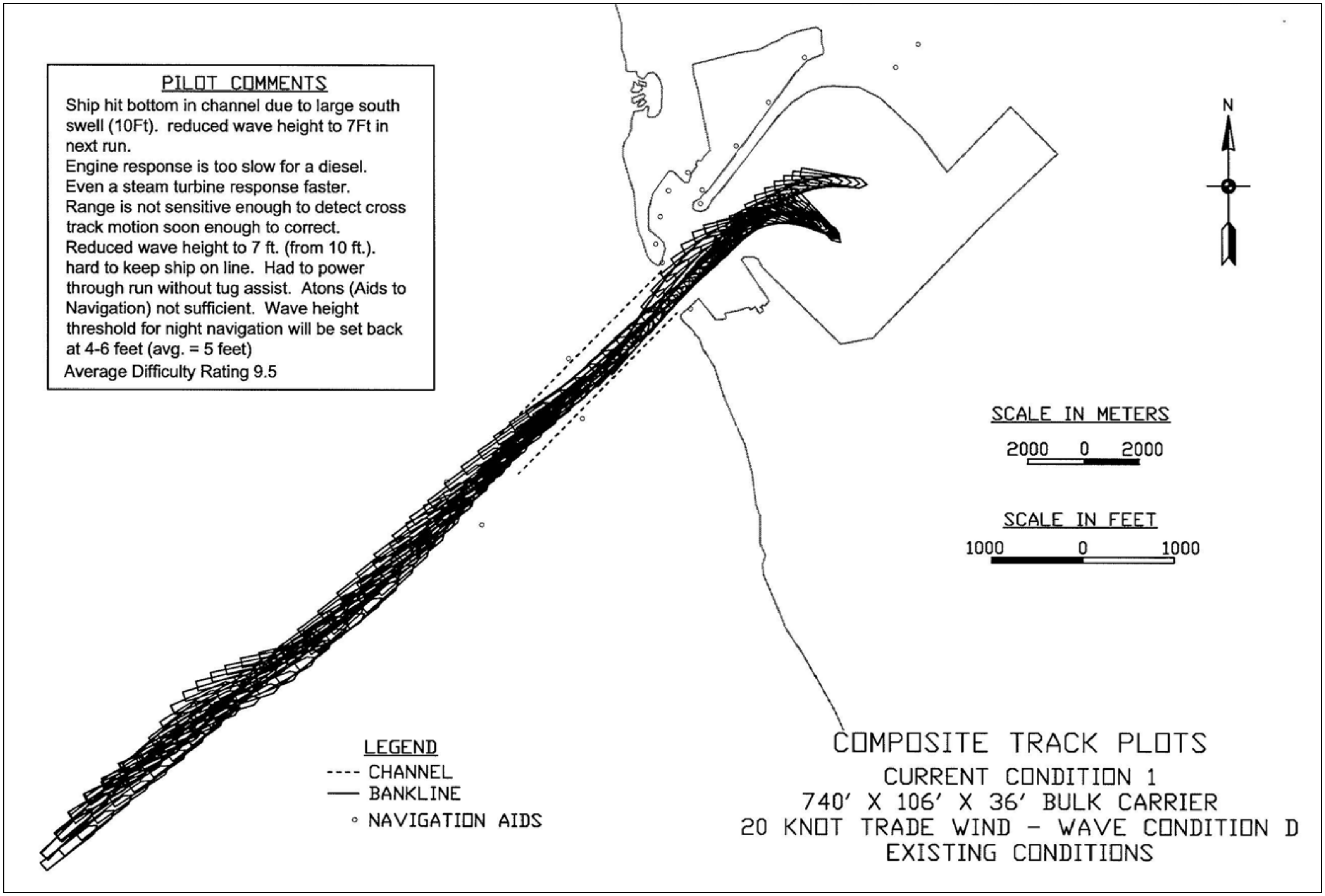

PILOT COMMENTS
Was low (to west side) on approach to buoys #1 & #2. Range engine not realistic. Average Difficulty Rating 6
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION D
EXISTING CONDITIONS

Plate 5


PILOT COMMENTS
Ship hit bottom in channel due to large south swell (10Ft). reduced wave height to 7Ft in next run.
Engine response is too slow for a diesel.
Even a steam turbine response faster.
Range is not sensitive enough to detect cross track motion soon enough to correct.
Reduced wave height to 7 ft. (from 10 ft.).
hard to keep ship on line. Had to power through run without tug assist. Atons (Aids to Navigation) not sufficient. Wave height threshold for night navigation will be set back at 4-6 feet (avg. = 5 feet)
Average Difficulty Rating 9.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION D
EXISTING CONDITIONS

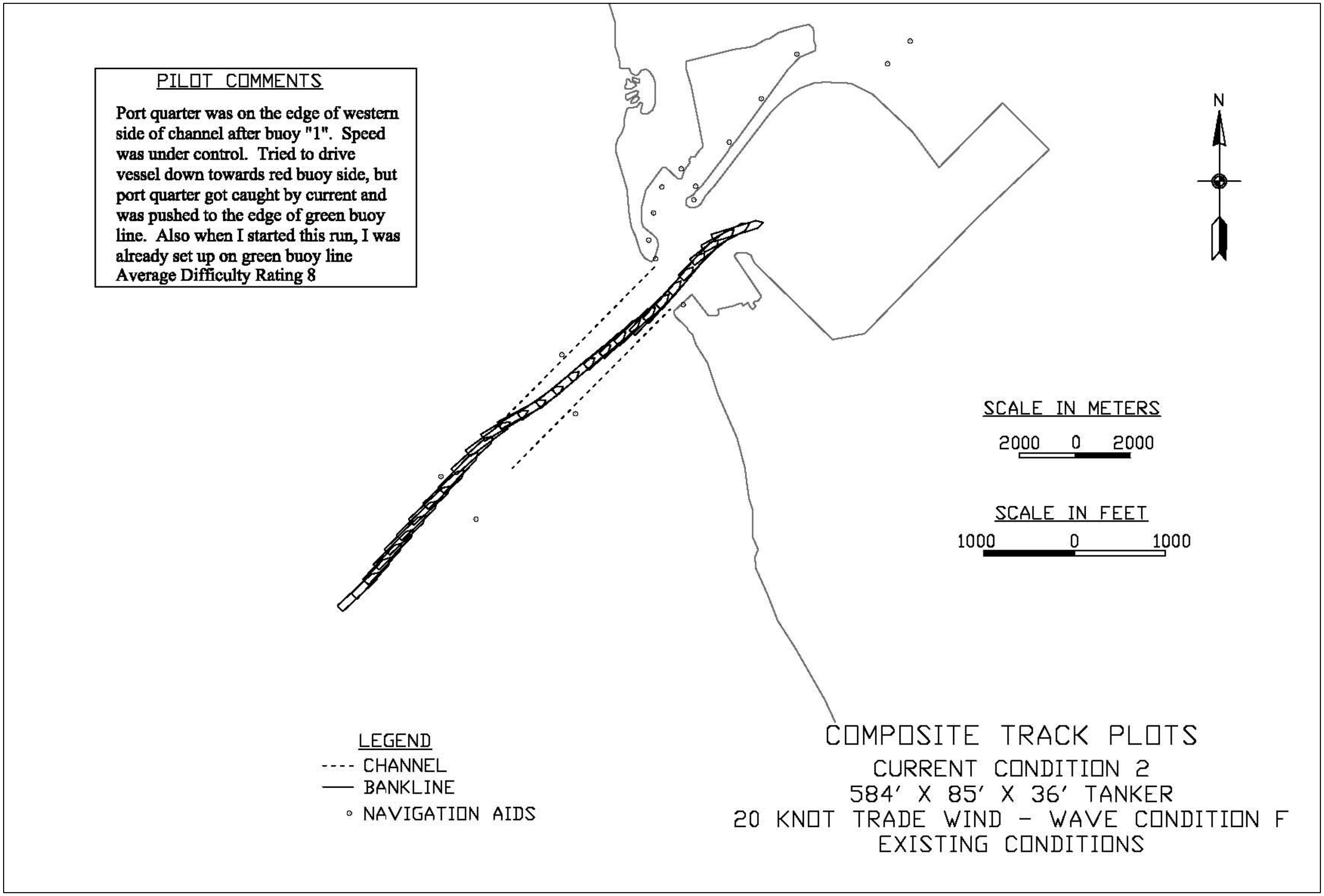
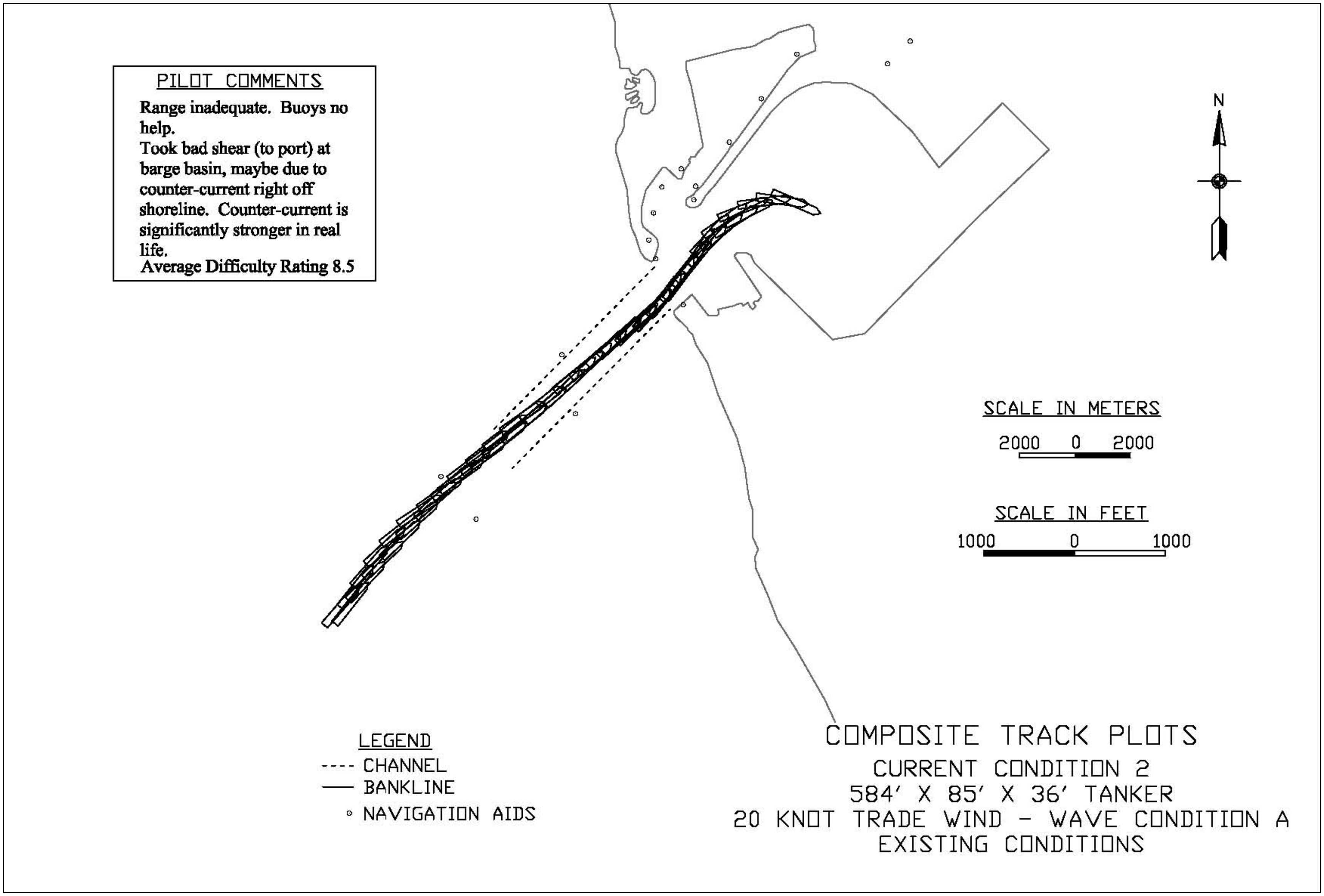

PILOT COMMENTS
Port quarter was on the edge of western side of channel after buoy "1". Speed was under control. Tried to drive vessel down towards red buoy side, but port quarter got caught by current and was pushed to the edge of green buoy line. Also when I started this run, I was already set up on green buoy line
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION F
EXISTING CONDITIONS

Plate 7


PILOT COMMENTS
Range inadequate. Buoys no help.
Took bad shear (to port) at barge basin, maybe due to counter-current right off shoreline. Counter-current is significantly stronger in real life.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
EXISTING CONDITIONS

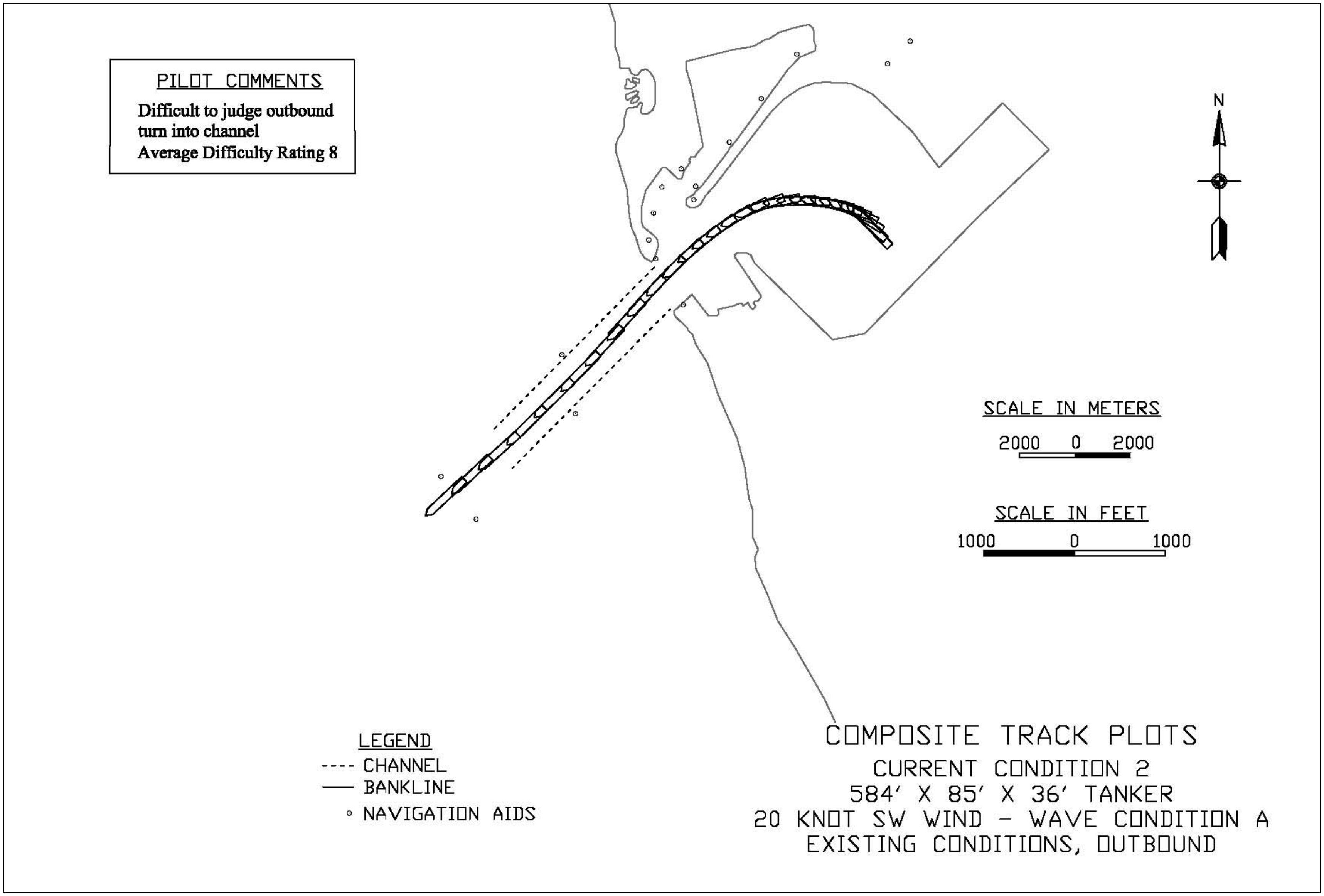
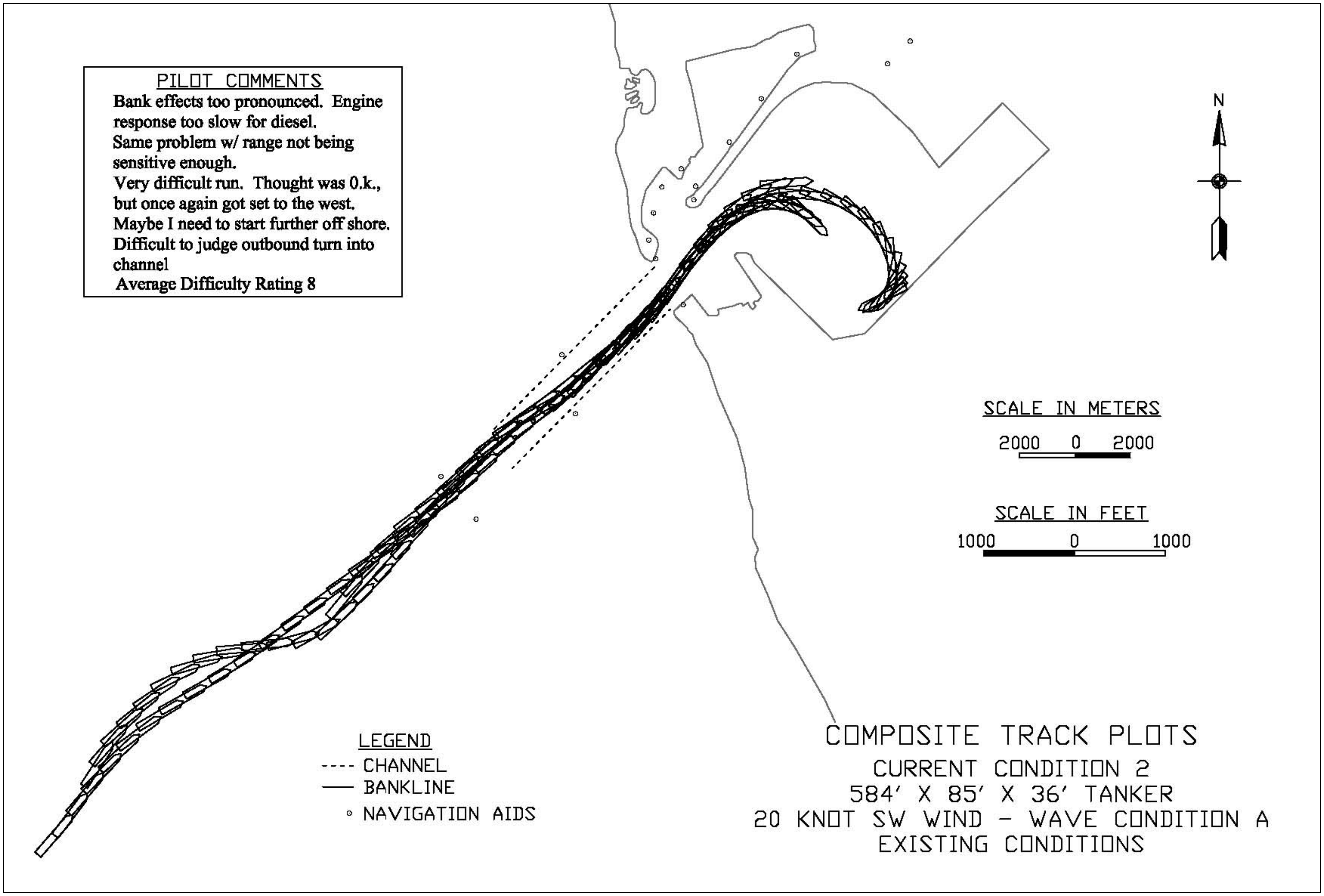

PILOT COMMENTS
Difficult to judge outbound turn into channel
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION A
EXISTING CONDITIONS, OUTBOUND

Plate 9


PILOT COMMENTS
Bank effects too pronounced. Engine response too slow for diesel.
Same problem w/ range not being sensitive enough.
Very difficult run. Thought was 0.k., but once again got set to the west.
Maybe I need to start further off shore.
Difficult to judge outbound turn into channel
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION A
EXISTING CONDITIONS

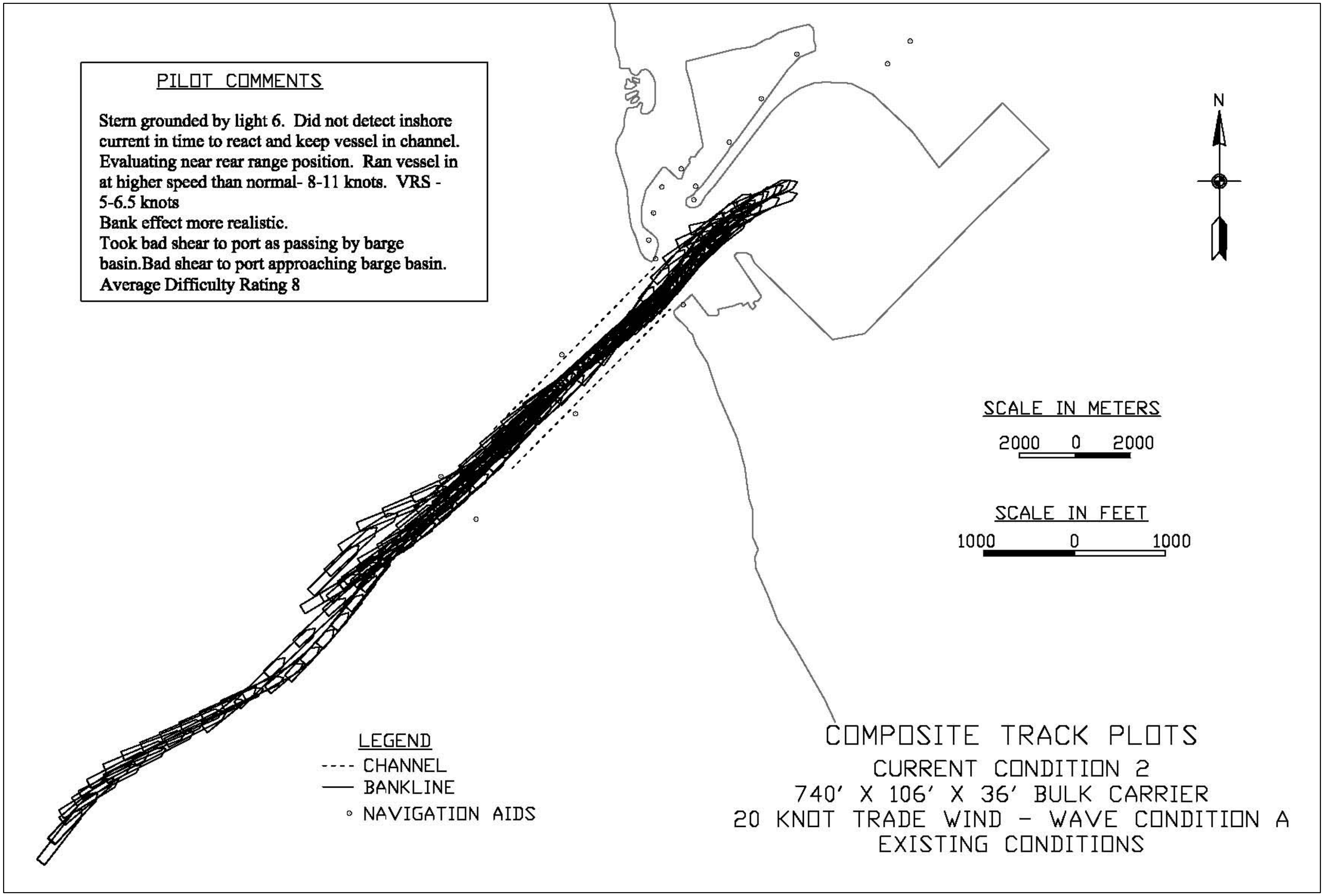

PILOT COMMENTS
Stern grounded by light 6. Did not detect inshore current in time to react and keep vessel in channel. Evaluating near rear range position. Ran vessel in at higher speed than normal- 8-11 knots. VRS - 5-6.5 knots
Bank effect more realistic.
Took bad shear to port as passing by barge basin.Bad shear to port approaching barge basin.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION A
EXISTING CONDITIONS

Plate 11

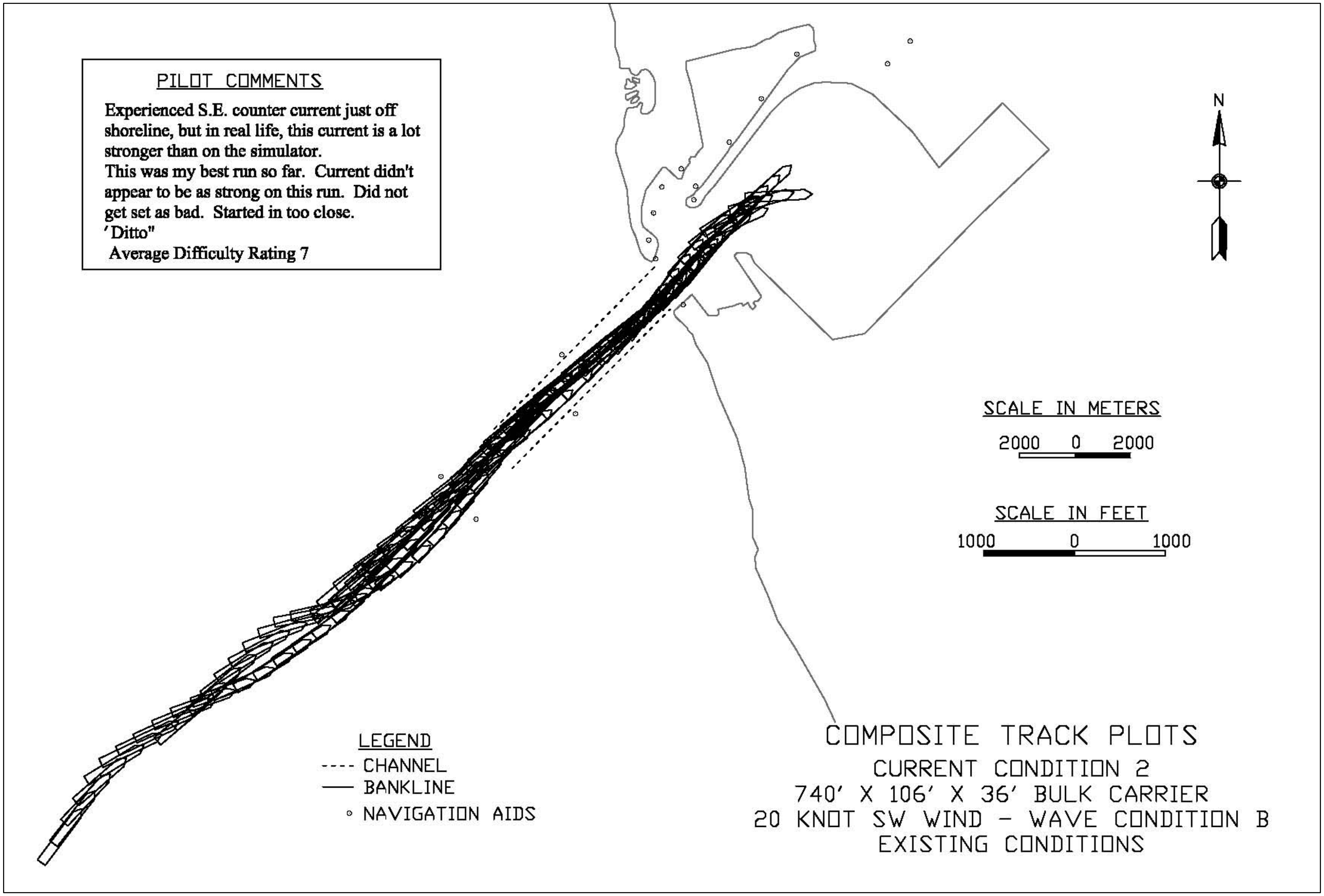
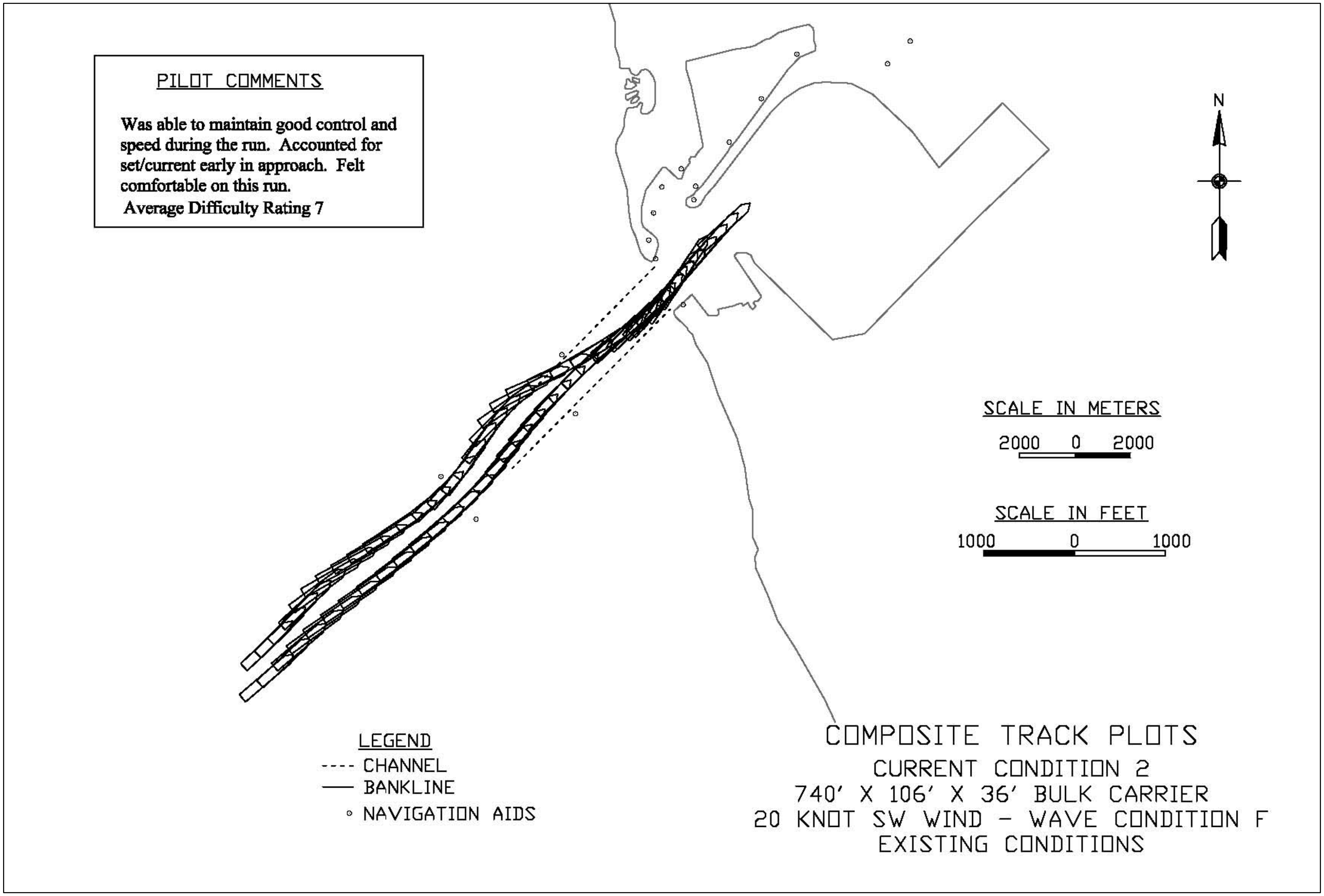
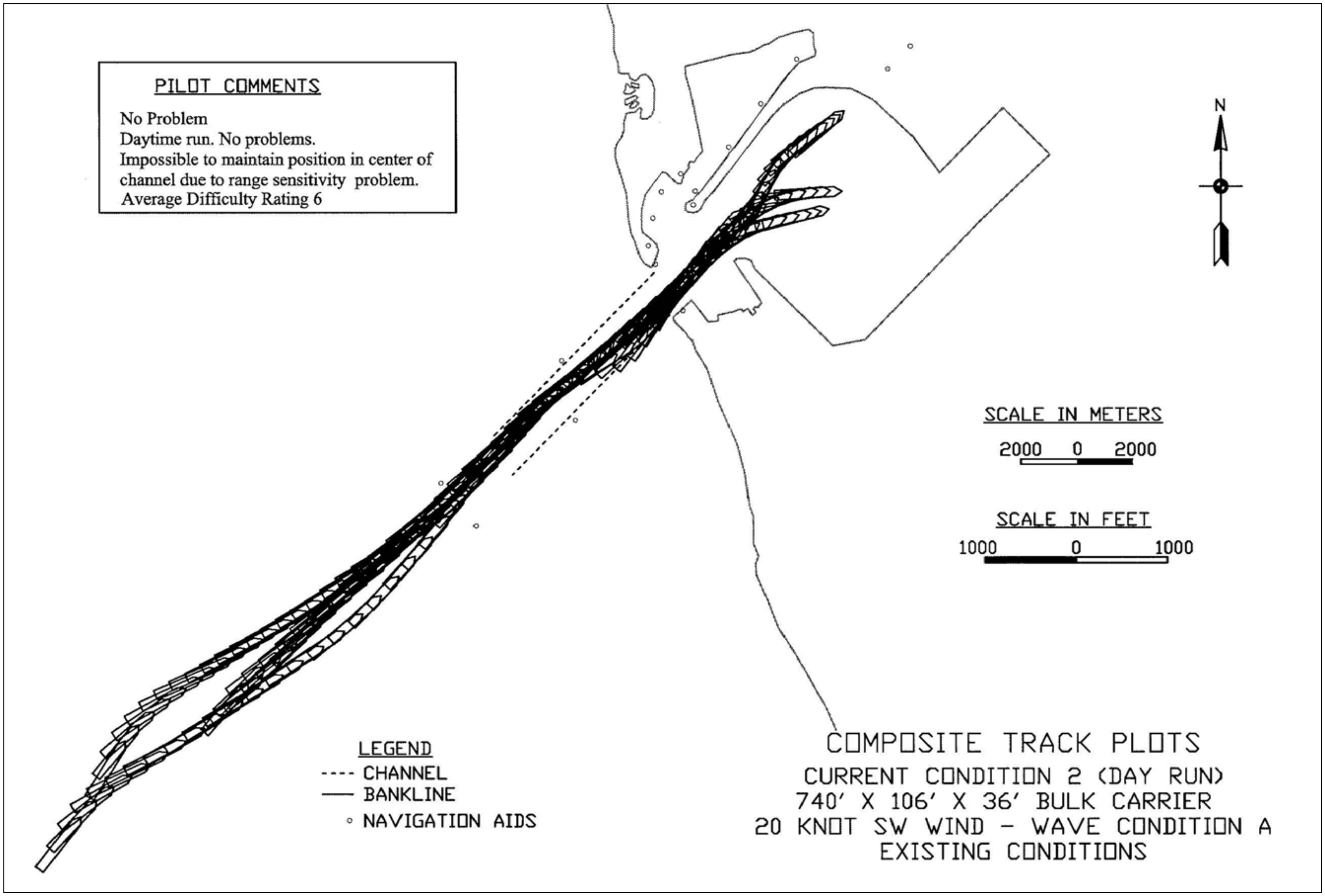

PILOT COMMENTS
Experienced S.E. counter current just off shoreline, but in real life, this current is a lot stronger than on the simulator.
This was my best run so far. Current didn't appear to be as strong on this run. Did not get set as bad. Started in too close.
'Ditto"
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION B
EXISTING CONDITIONS

Plate 12


PILOT COMMENTS
Was able to maintain good control and speed during the run. Accounted for set/current early in approach. Felt comfortable on this run.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION F
EXISTING CONDITIONS


PILOT COMMENTS
No Problem
Daytime run. No problems.
Impossible to maintain position in center of channel due to range sensitivity problem.
Average Difficulty Rating 6
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2 (DAY RUN)
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION A
EXISTING CONDITIONS

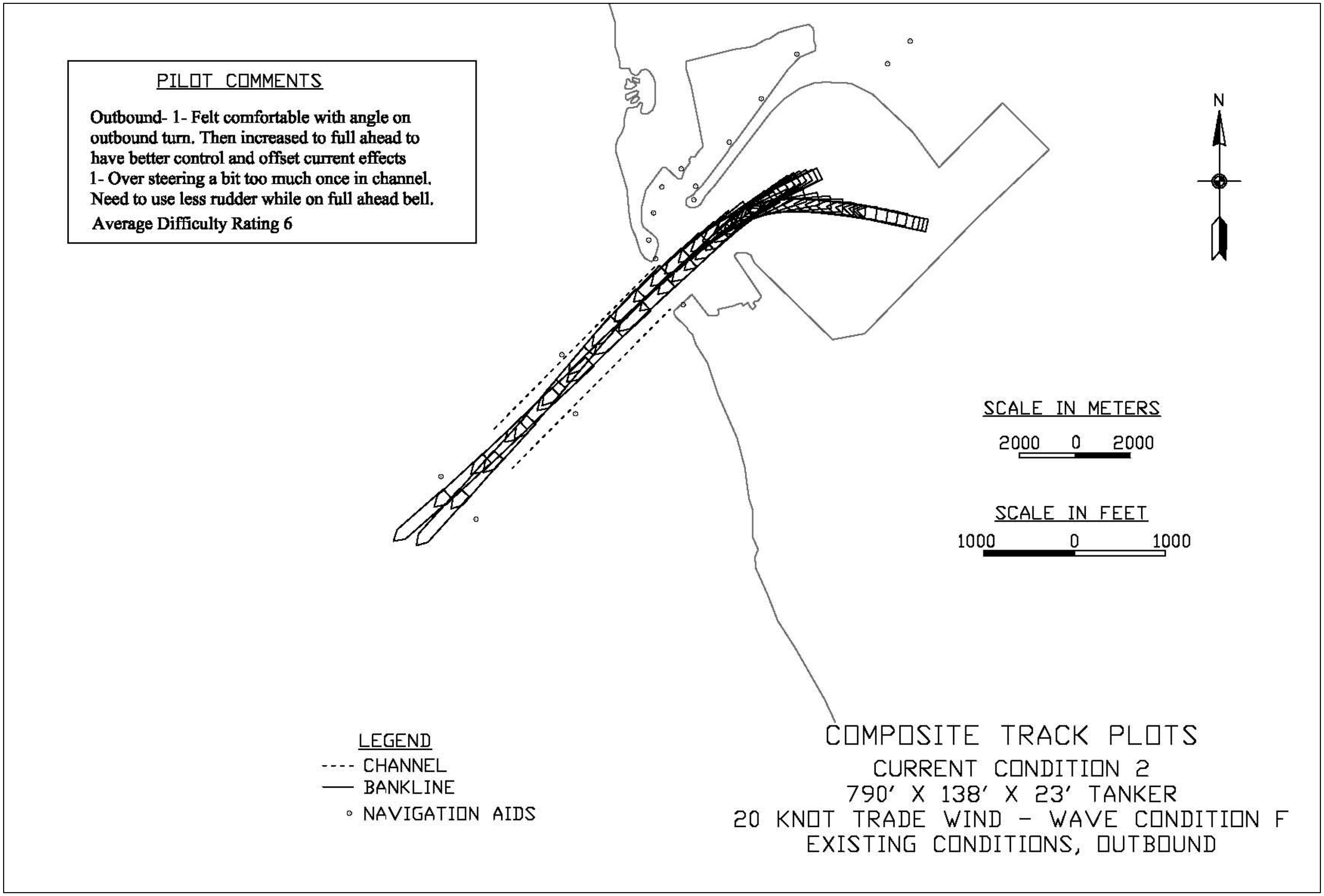
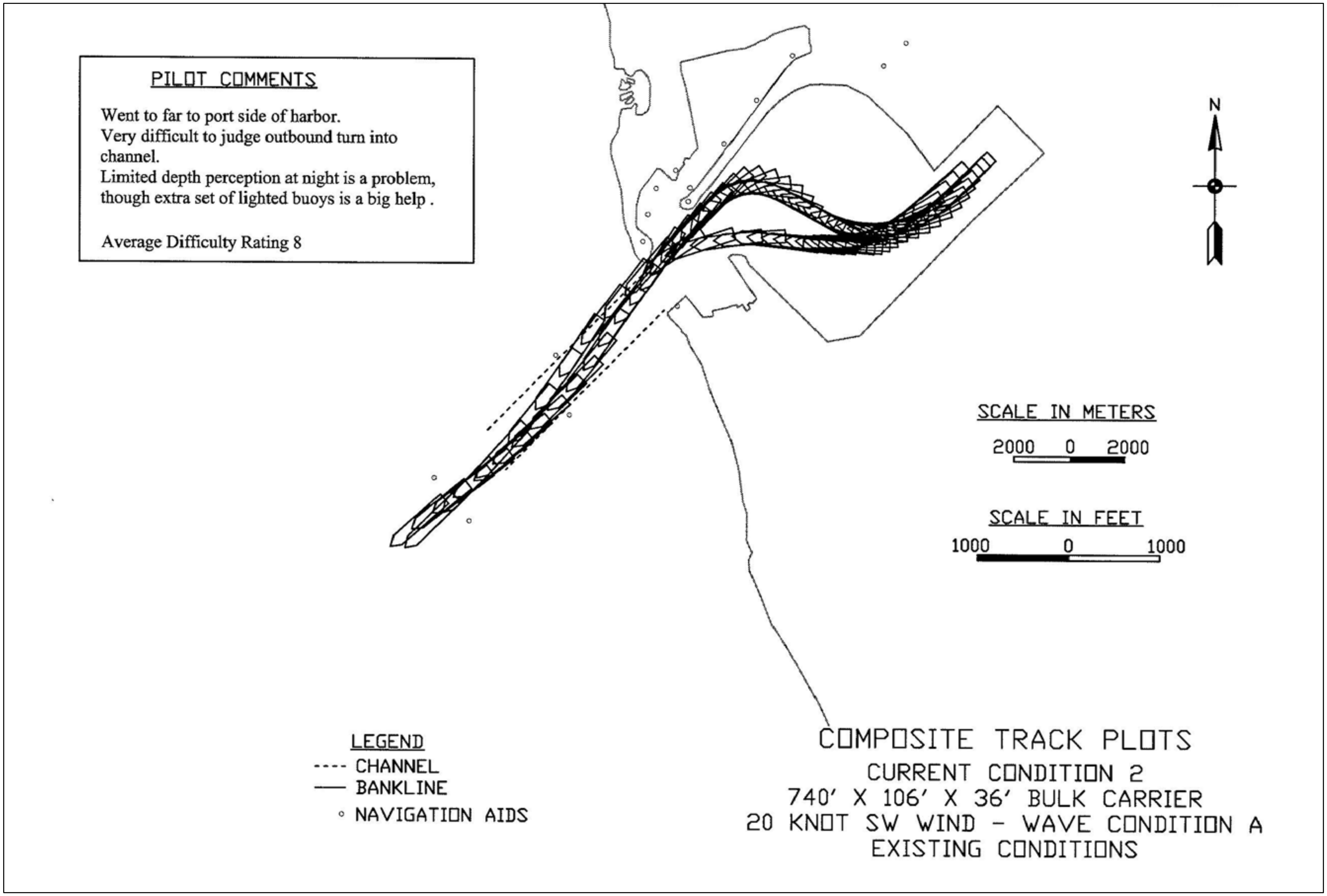
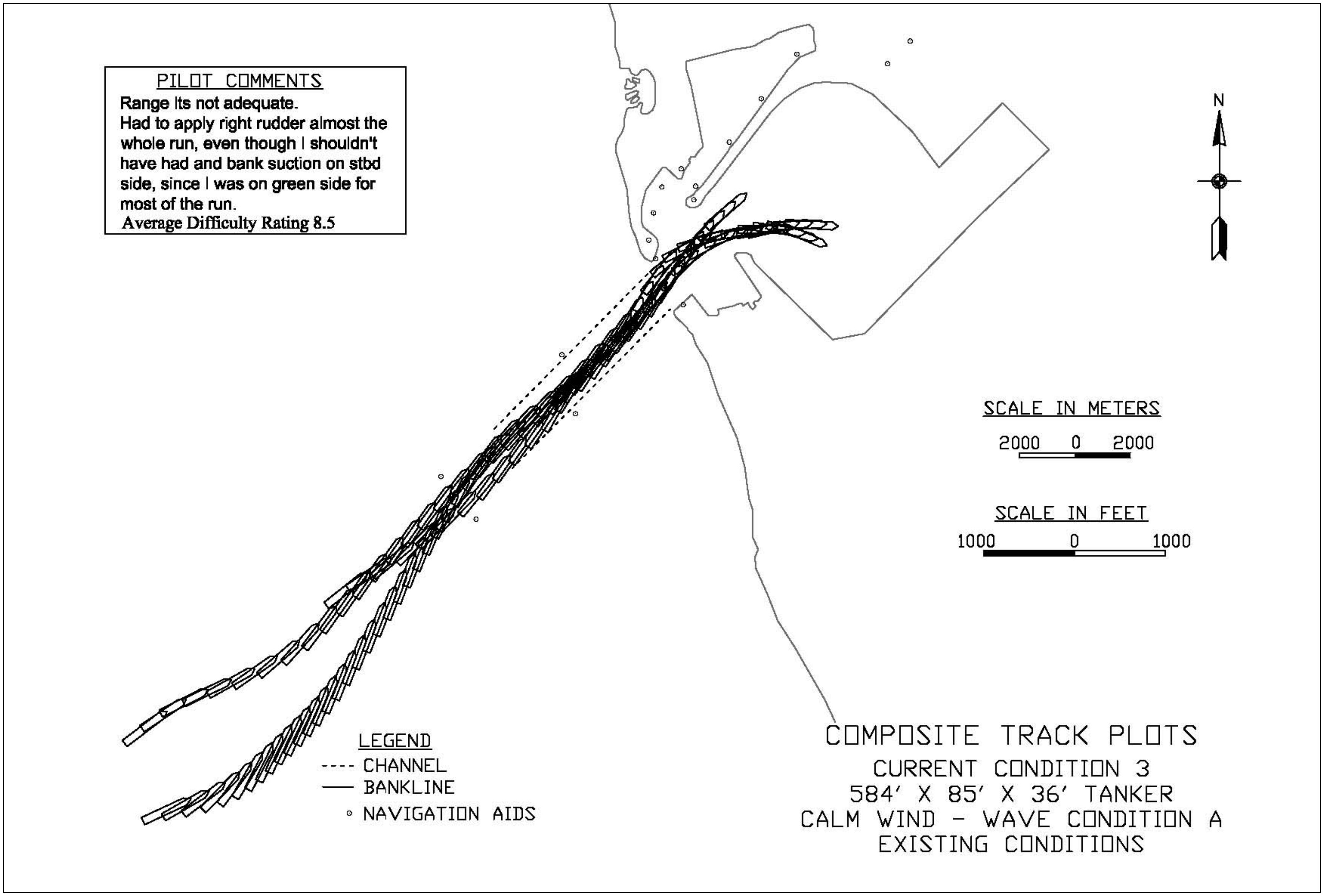
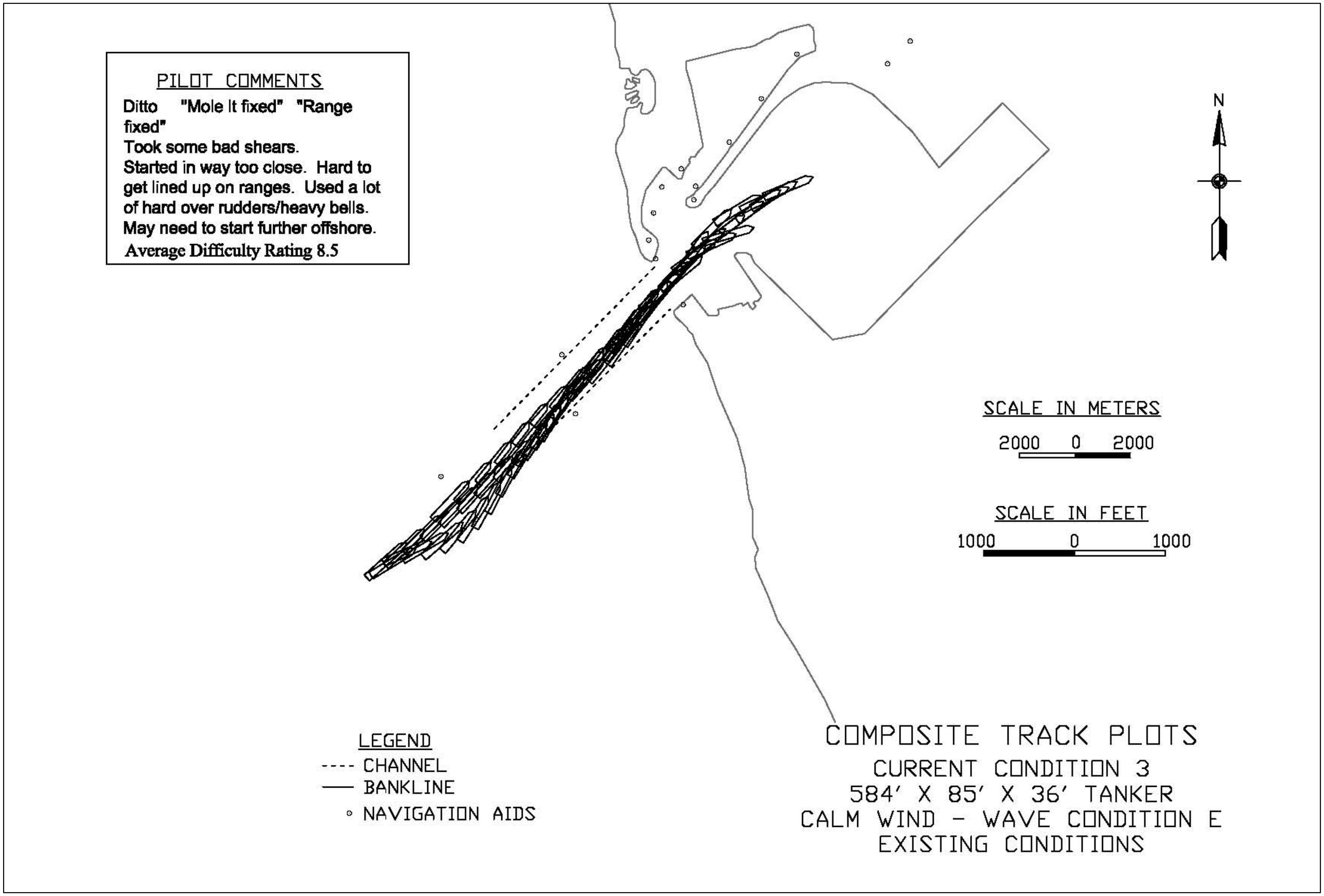
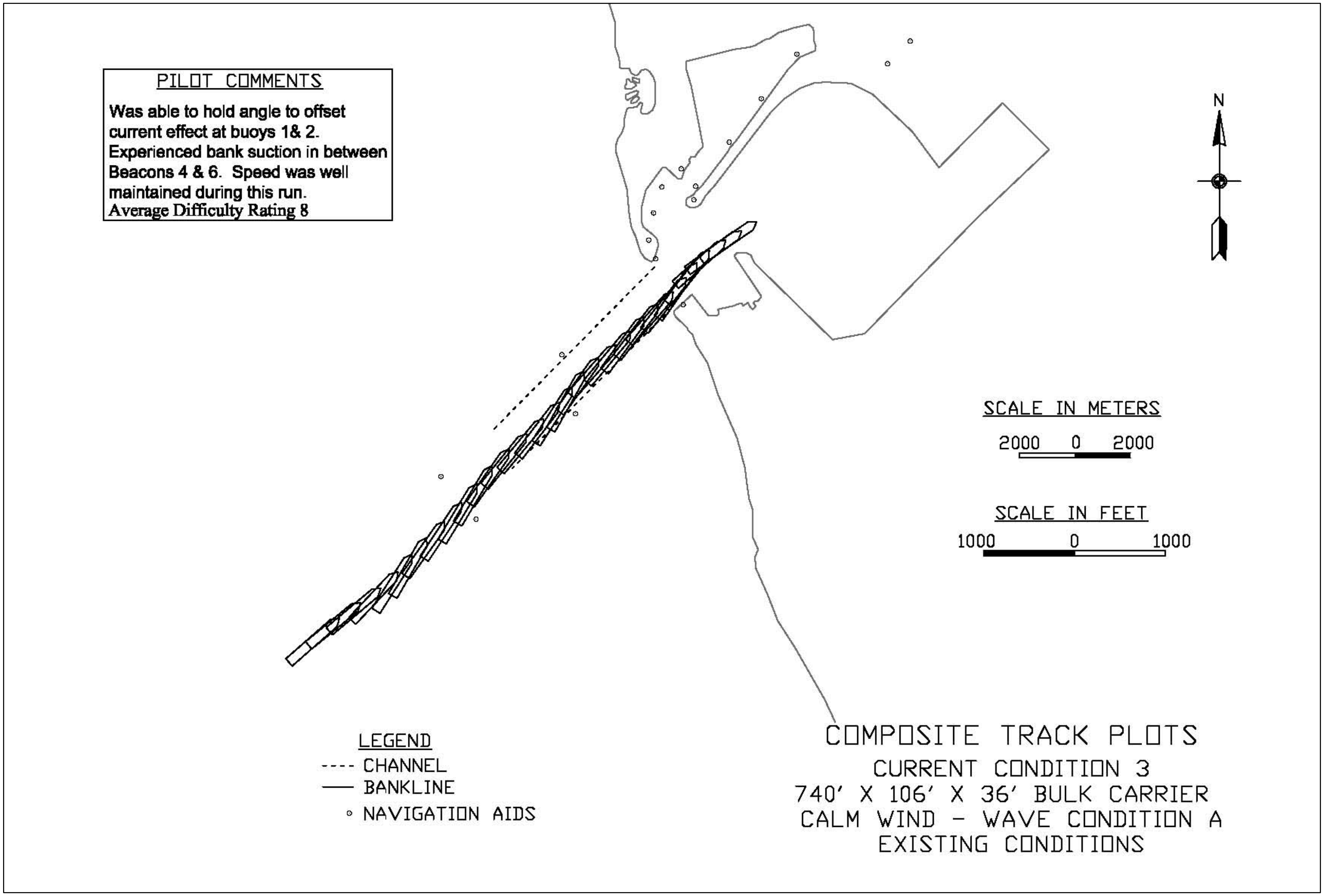

PILOT COMMENTS
Outbound- 1- Felt comfortable with angle on outbound turn. Then increased to full ahead to have better control and offset current effects
1- Over steering a bit too much once in channel. Need to use less rudder while on full ahead bell.
Average Difficulty Rating 6
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
790' X 138' X 23' TANKER
20 KNOT TRADE WIND - WAVE CONDITION F
EXISTING CONDITIONS, OUTBOUND

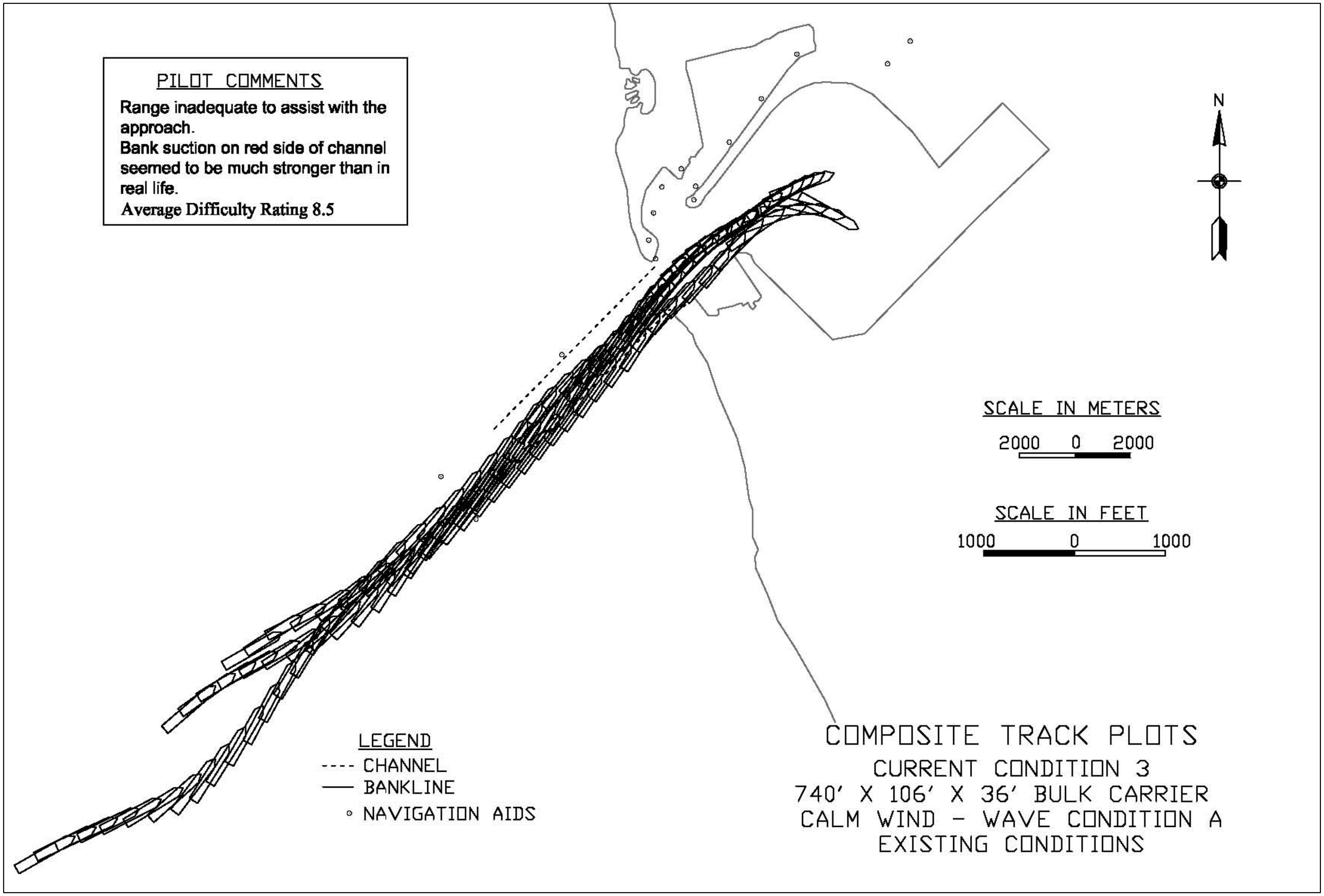
Plate 15


PILOT COMMENTS
Went to far to port side of harbor.
Very difficult to judge outbound turn into channel.
Limited depth perception at night is a problem, though extra set of lighted buoys is a big help .
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
---- CHANNEL
— BANKLINE
∘ NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION A
EXISTING CONDITIONS

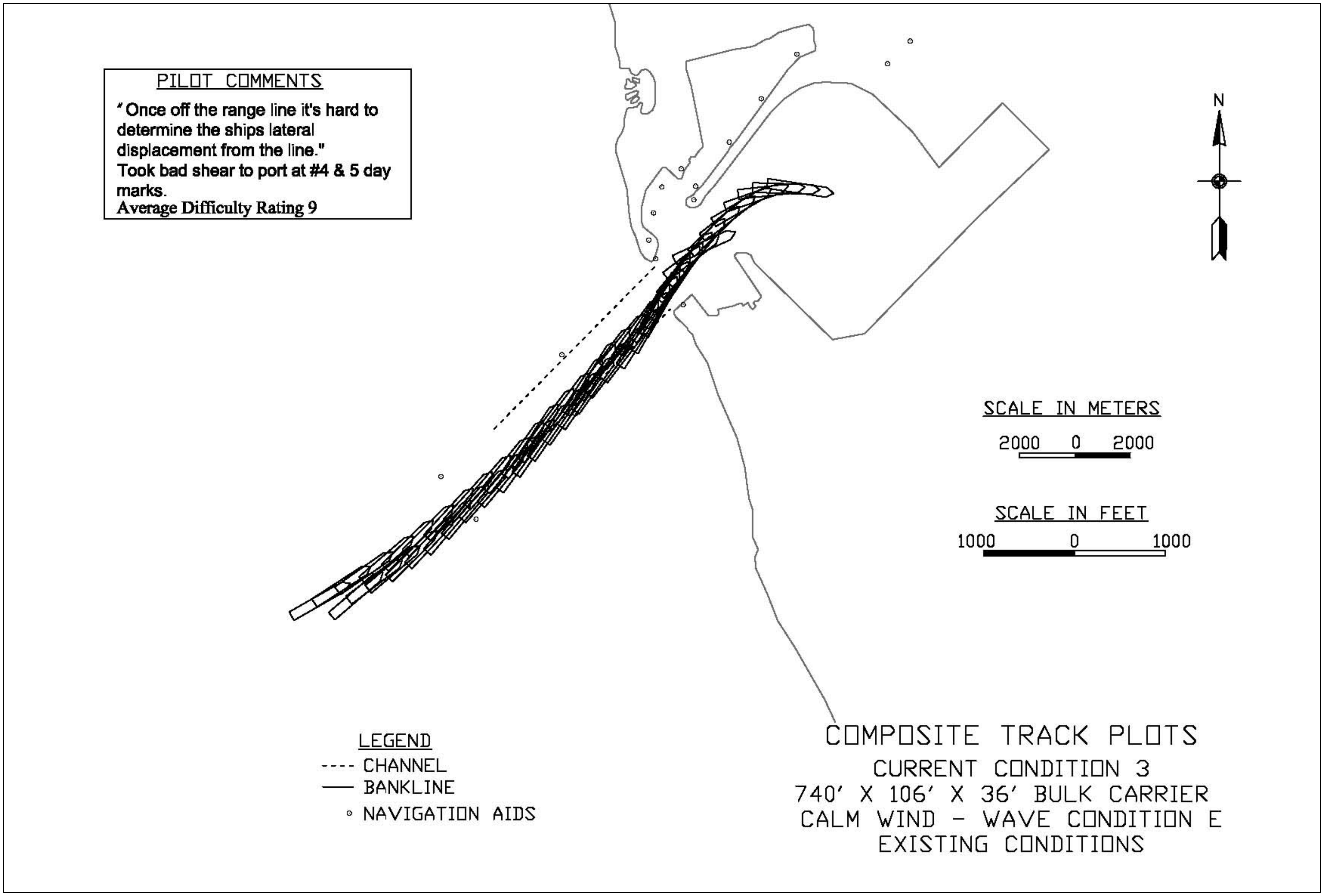

PILOT COMMENTS
Range lts not adequate.
Had to apply right rudder almost the whole run, even though I shouldn't have had and bank suction on stbd side, since I was on green side for most of the run.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584′ X 85′ X 36′ TANKER
CALM WIND - WAVE CONDITION A
EXISTING CONDITIONS

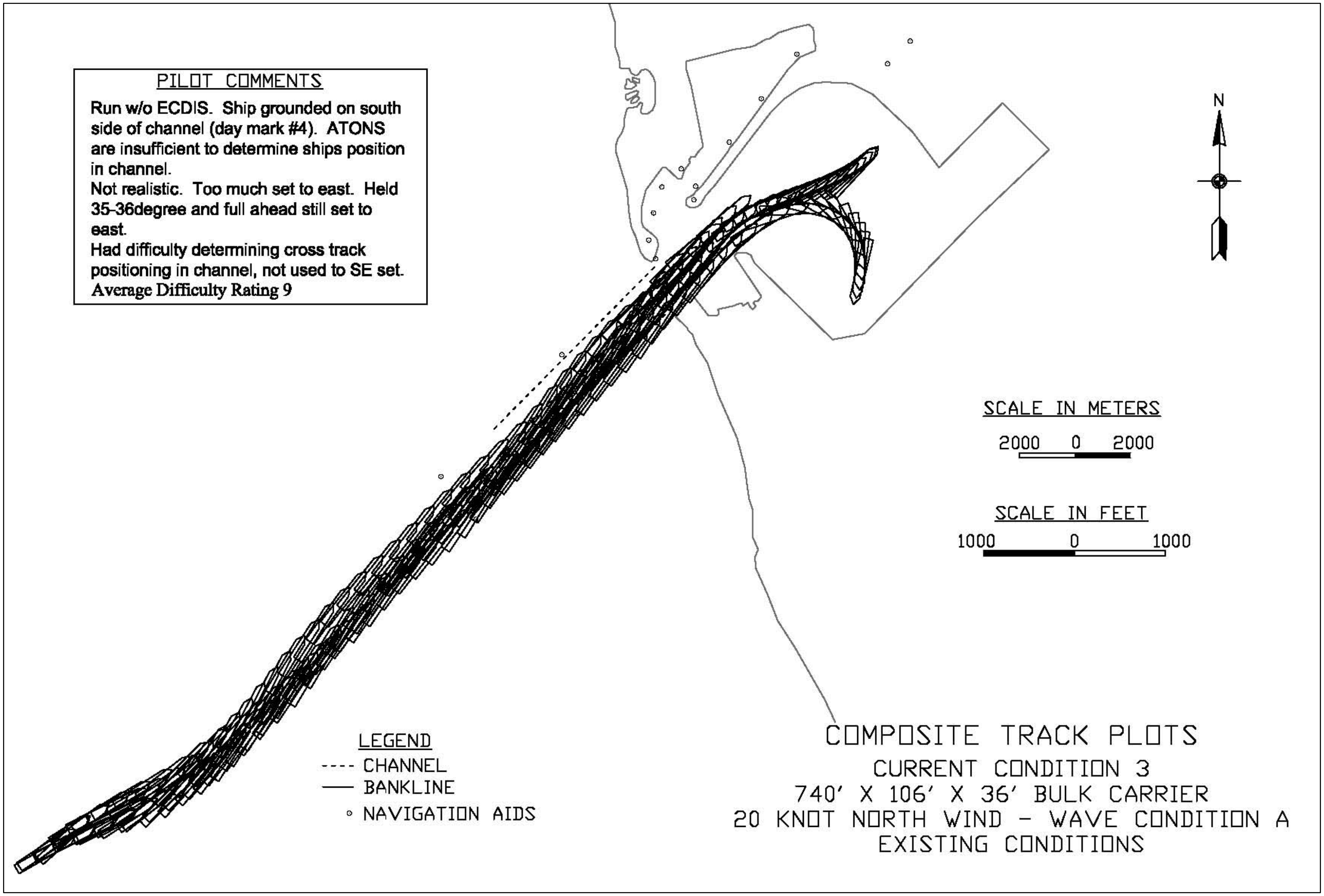

PILOT COMMENTS
Ditto "Mole lt fixed" "Range fixed"
Took some bad shears.
Started in way too close. Hard to get lined up on ranges. Used a lot of hard over rudders/heavy bells.
May need to start further offshore.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
CALM WIND - WAVE CONDITION E
EXISTING CONDITIONS


PILOT COMMENTS
Was able to hold angle to offset current effect at buoys 1& 2. Experienced bank suction in between Beacons 4 & 6. Speed was well maintained during this run.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION A
EXISTING CONDITIONS



COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION A
EXISTING CONDITIONS


PILOT COMMENTS
"Once off the range line it's hard to determine the ships lateral displacement from the line."
Took bad shear to port at #4 & 5 day marks.
Average Difficulty Rating 9
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION E
EXISTING CONDITIONS


PILOT COMMENTS
Run w/o ECDIS. Ship grounded on south side of channel (day mark #4). ATONS are insufficient to determine ships position in channel.
Not realistic. Too much set to east. Held 35-36degree and full ahead still set to east.
Had difficulty determining cross track positioning in channel, not used to SE set.
Average Difficulty Rating 9
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
EXISTING CONDITIONS

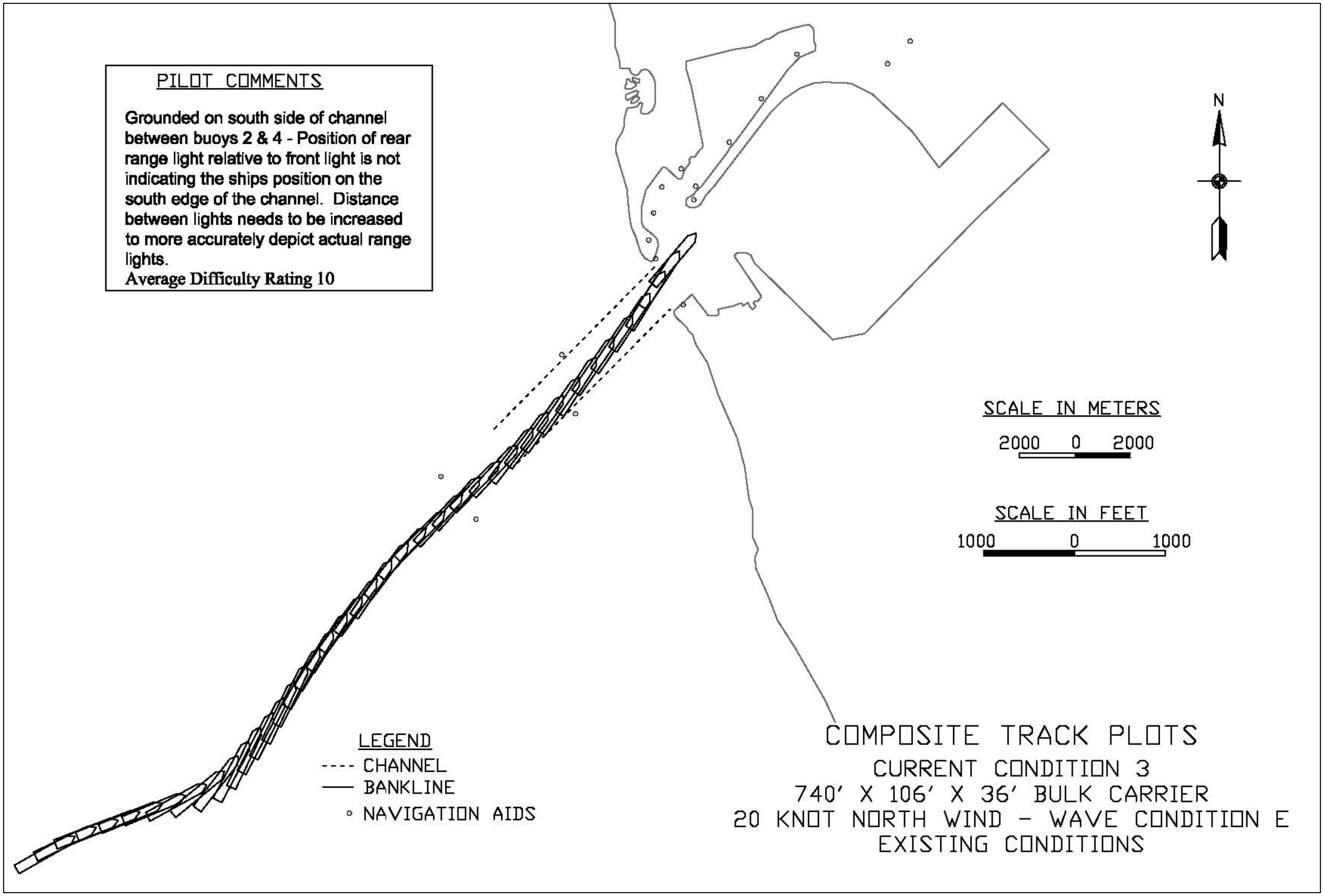
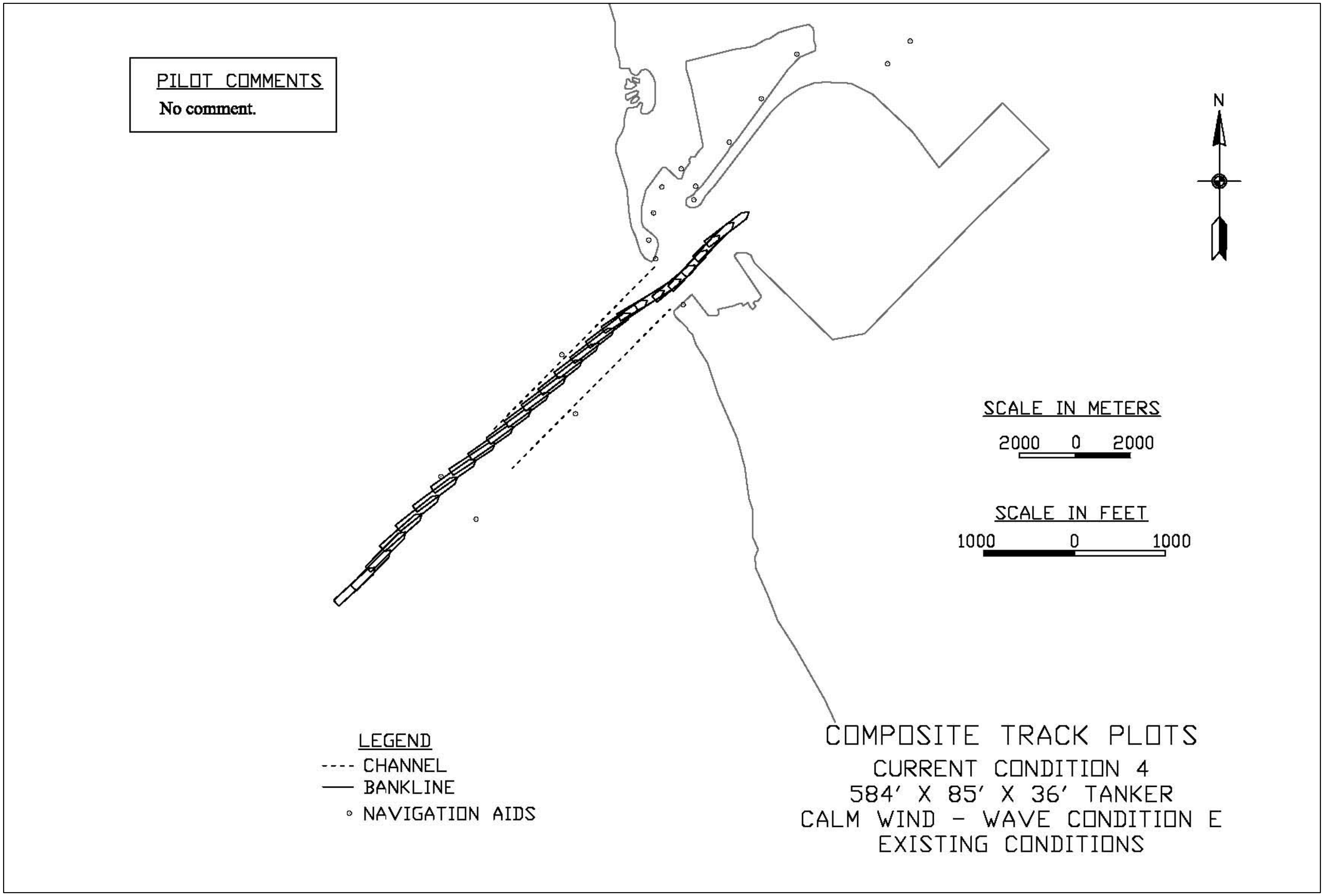
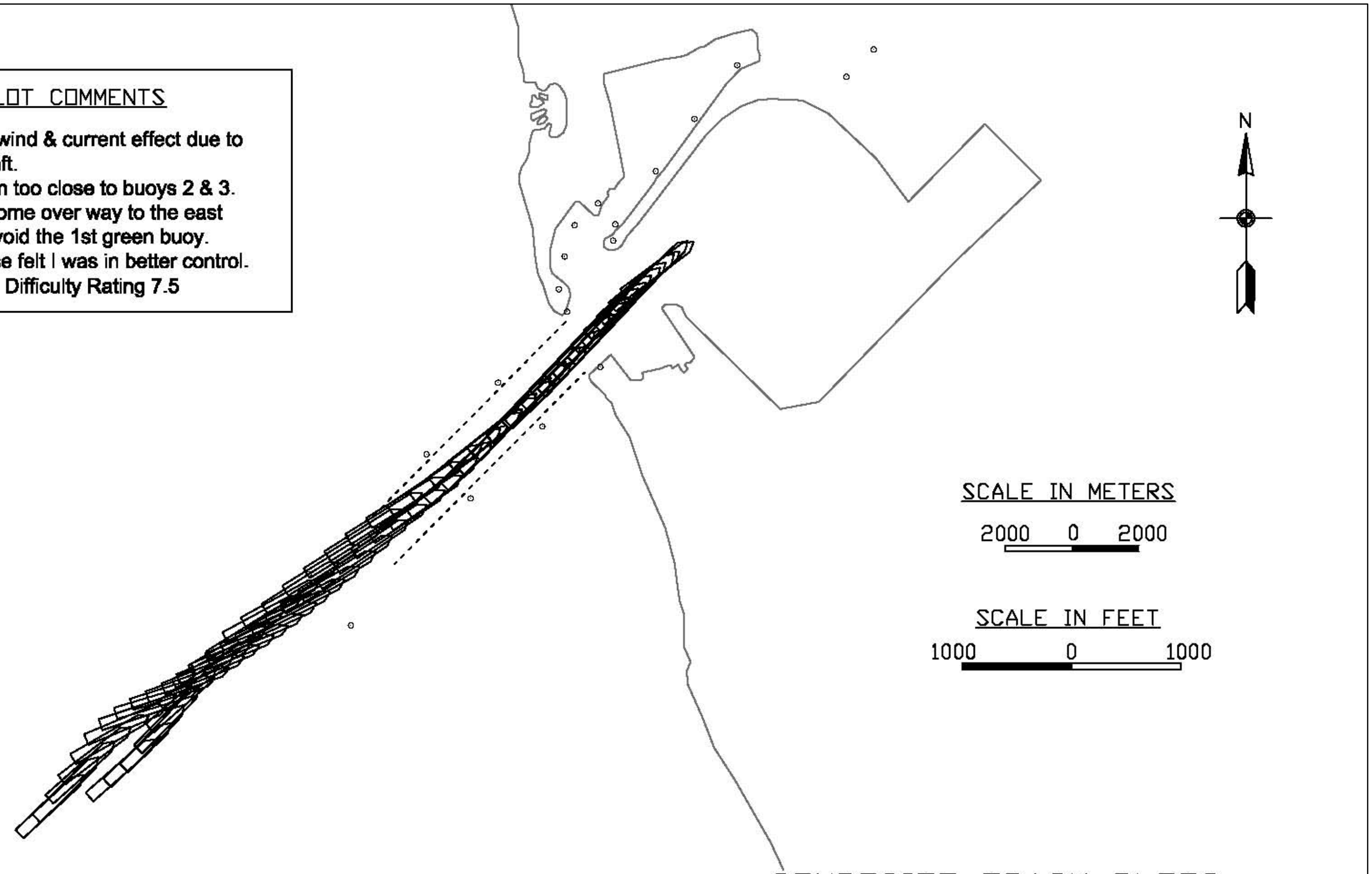

PILOT COMMENTS
Grounded on south side of channel between buoys 2 & 4 - Position of rear range light relative to front light is not indicating the ships position on the south edge of the channel. Distance between lights needs to be increased to more accurately depict actual range lights.
Average Difficulty Rating 10
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION E
EXISTING CONDITIONS

Plate 23


PILOT COMMENTS
No comment.
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 4
584′ X 85′ X 36′ TANKER
CALM WIND – WAVE CONDITION E
EXISTING CONDITIONS

PILOT COMMENTS

Minimal wind & current effect due to deep draft.
Started in too close to buoys 2 & 3.
Had to come over way to the east just to avoid the 1st green buoy.
Otherwise felt I was in better control.
Average Difficulty Rating 7.5



LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS

COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
796′ X 106′ X 23′ TANKER
20 KNOT TRADE WIND - WAVE CONDITION C
DESIGN 1 CONDITIONS

Plate 25

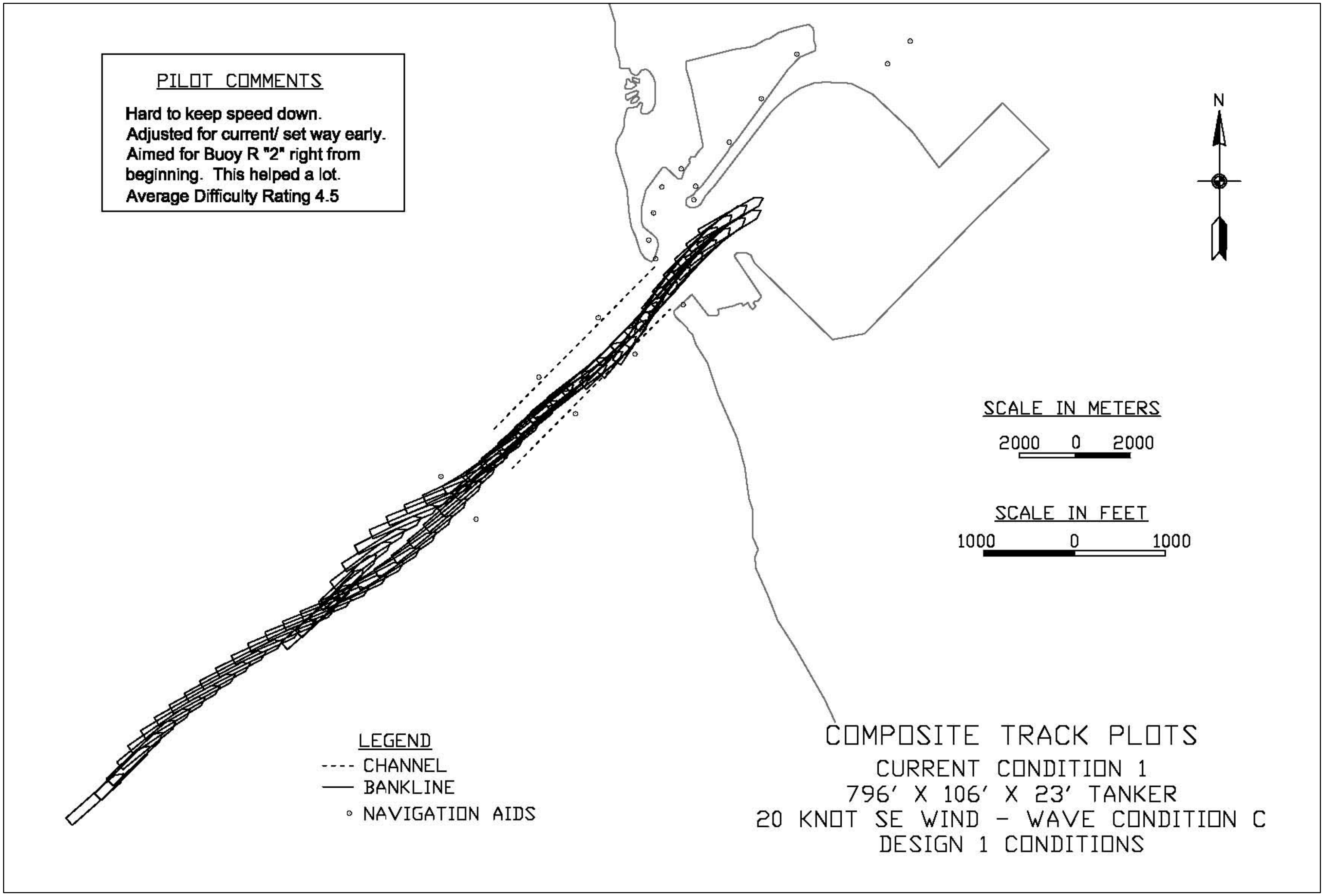
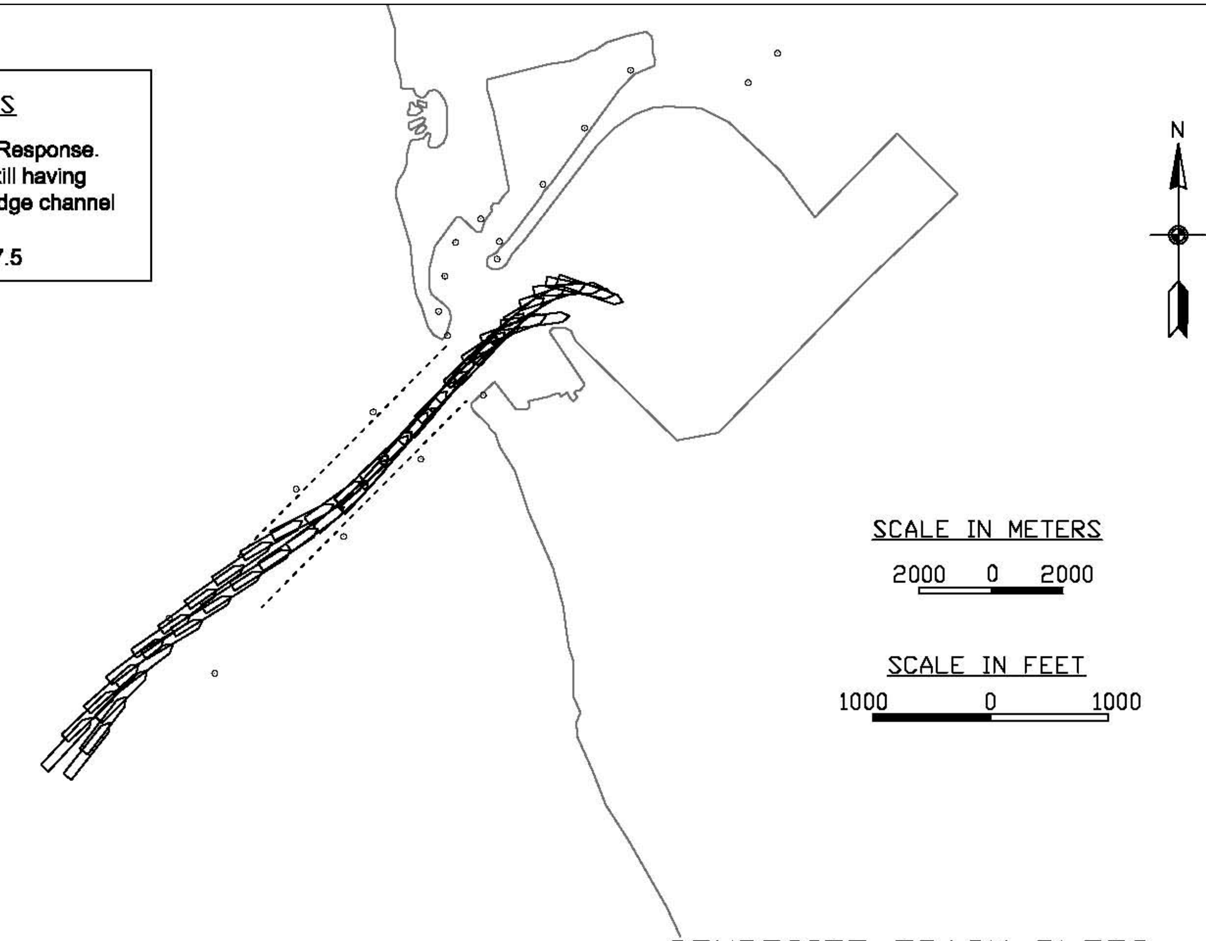

PILOT COMMENTS
Hard to keep speed down.
Adjusted for current/ set way early.
Aimed for Buoy R "2" right from beginning. This helped a lot.
Average Difficulty Rating 4.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
796' X 106' X 23' TANKER
20 KNOT SE WIND - WAVE CONDITION C
DESIGN 1 CONDITIONS

Plate 26

PILOT COMMENTS

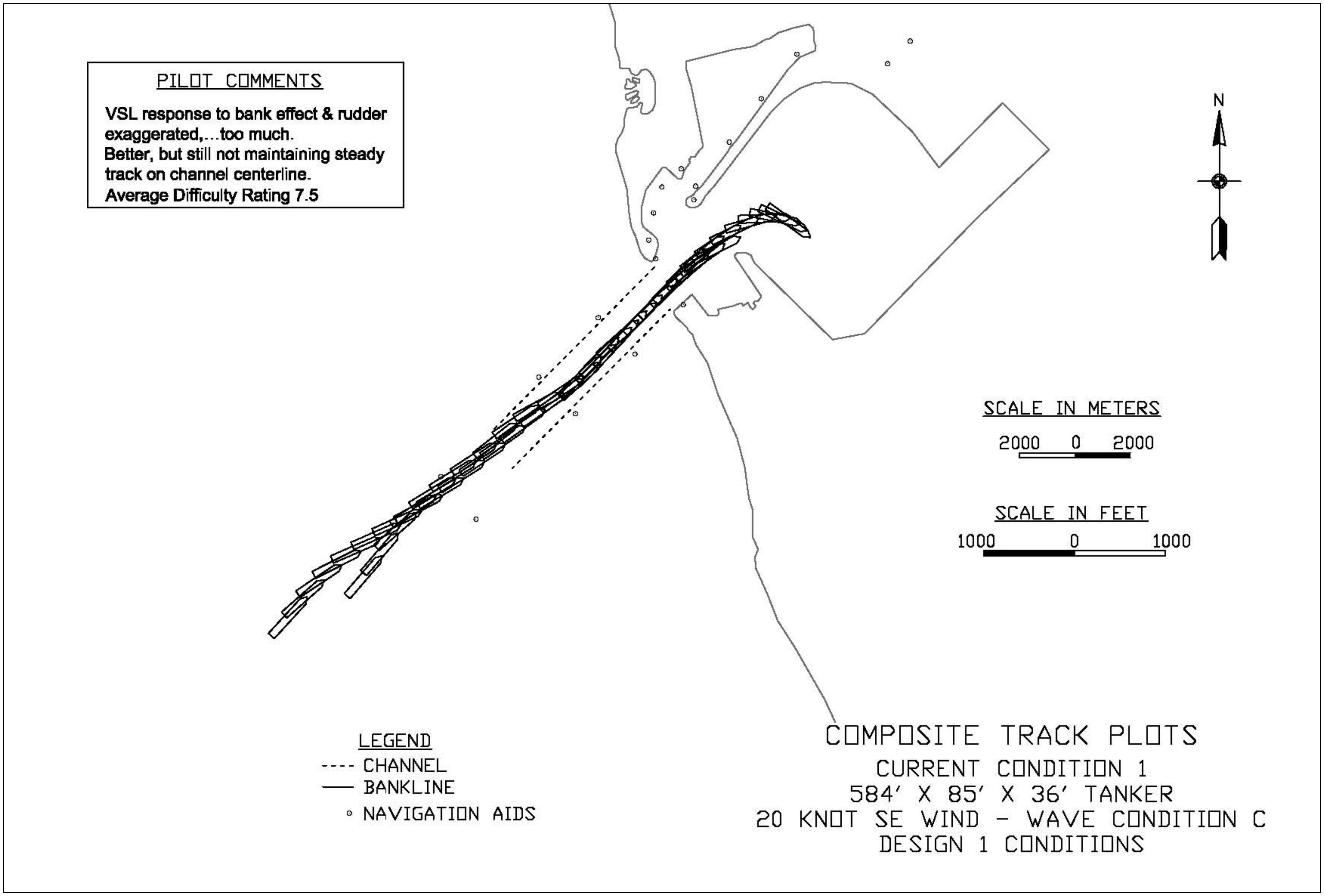
Range not sensitive eng. Response. Extra buoys are helpful, still having difficulty using range to judge channel position, current.
Average Difficulty Rating 7.5

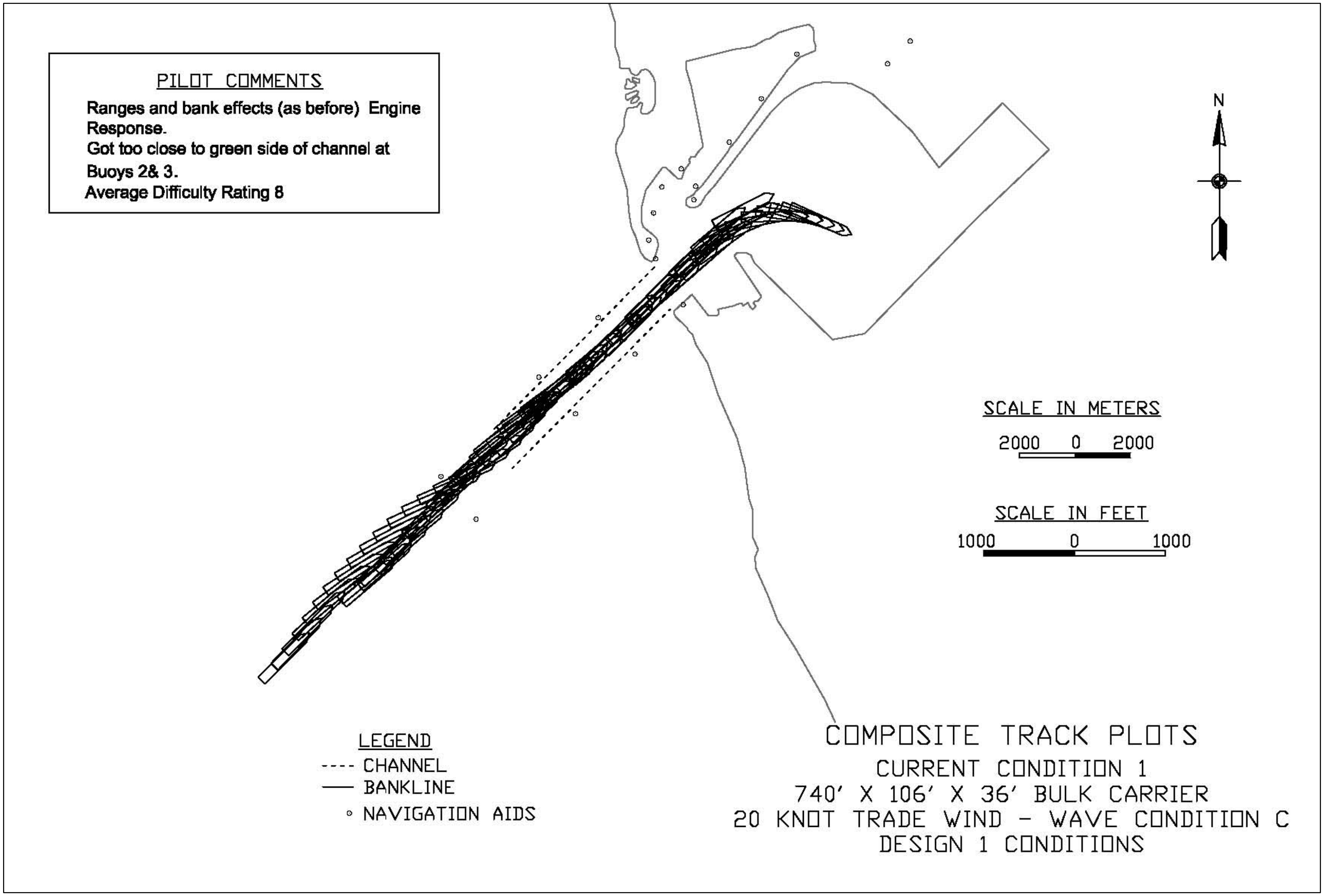


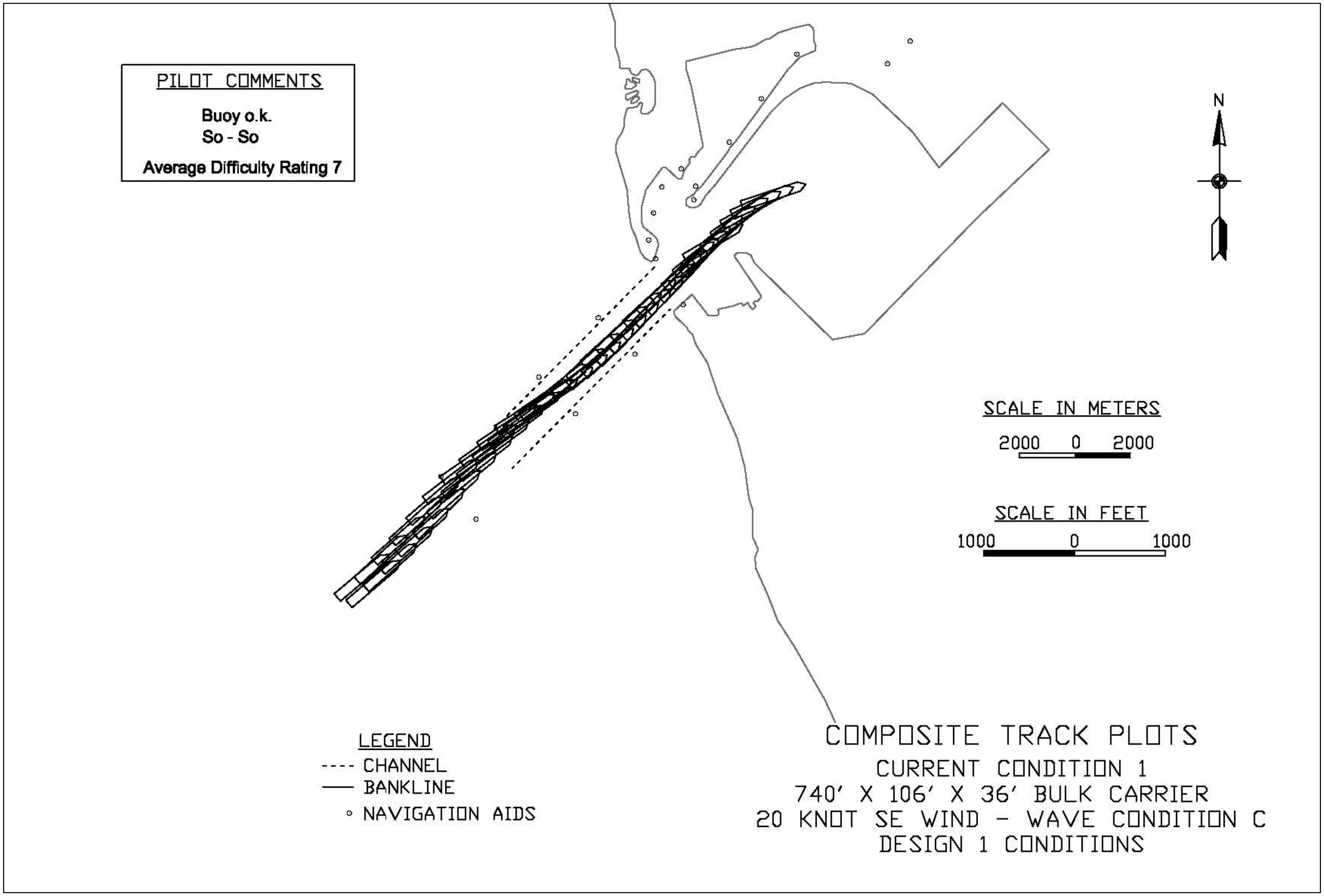
LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS

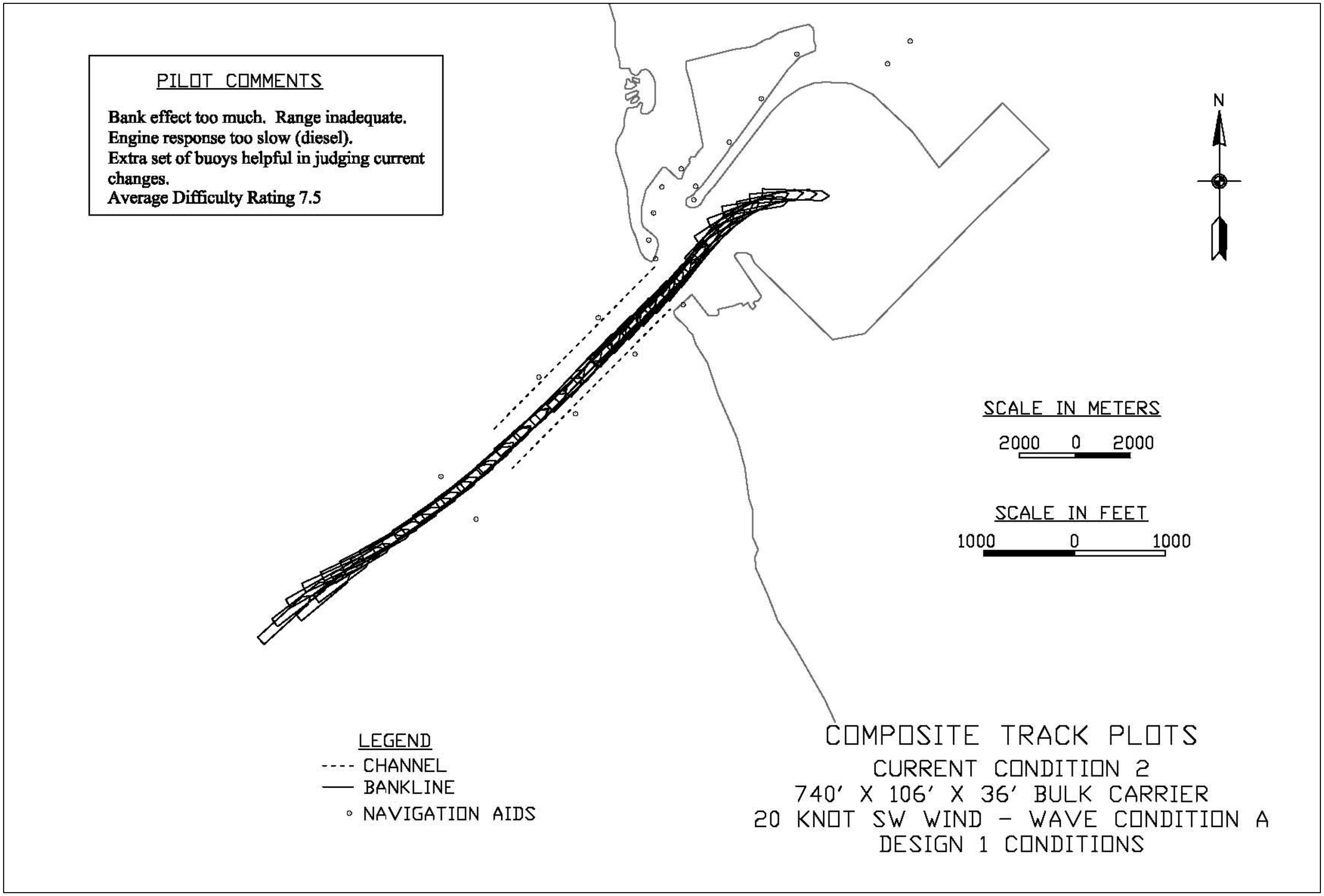
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584′ X 85′ X 36′ TANKER
20 KNOT TRADE WIND - WAVE CONDITION D
DESIGN 1 CONDITIONS

Plate 27


PILOT COMMENTS
VSL response to bank effect & rudder exaggerated,…too much.
Better, but still not maintaining steady track on channel centerline.
Average Difficulty Rating 7.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584′ X 85′ X 36′ TANKER
20 KNOT SE WIND - WAVE CONDITION C
DESIGN 1 CONDITIONS

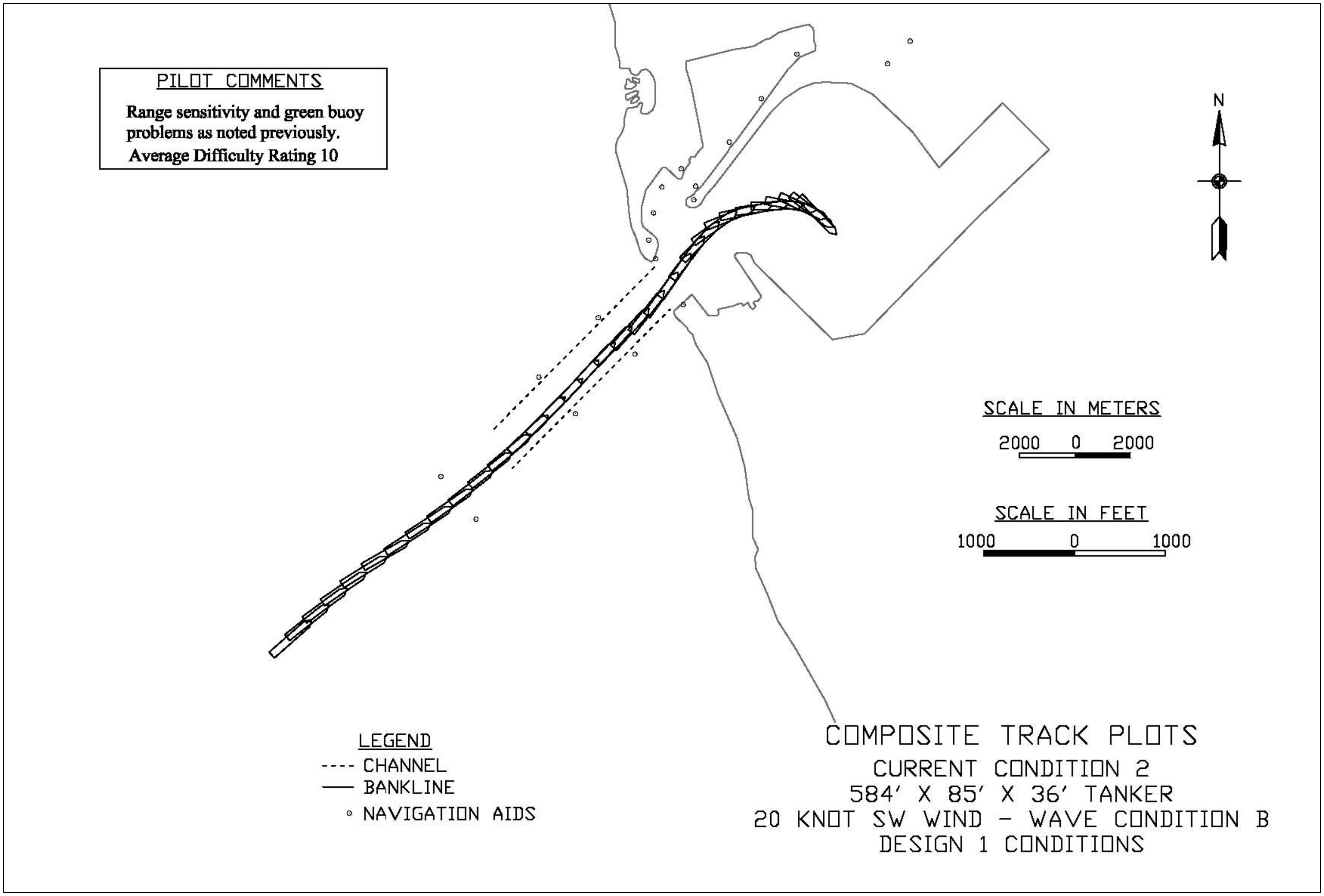

PILOT COMMENTS
Ranges and bank effects (as before) Engine Response.
Got too close to green side of channel at Buoys 2& 3.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION C
DESIGN 1 CONDITIONS


PILOT COMMENTS
Buoy o.k.
So - So
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT SE WIND - WAVE CONDITION C
DESIGN 1 CONDITIONS



COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS

Plate 31


PILOT COMMENTS
Range sensitivity and green buoy problems as noted previously.
Average Difficulty Rating 10
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 1 CONDITIONS

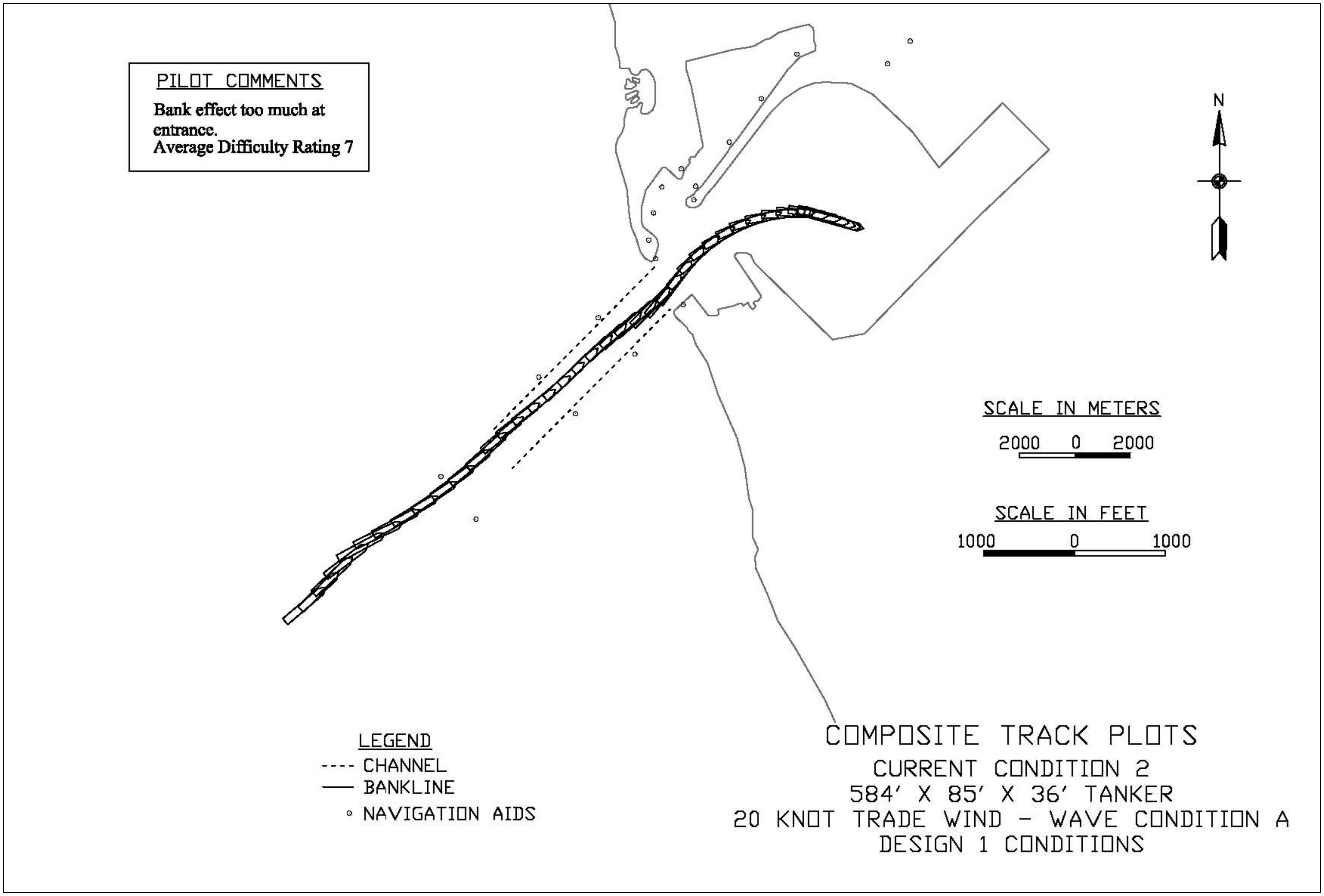
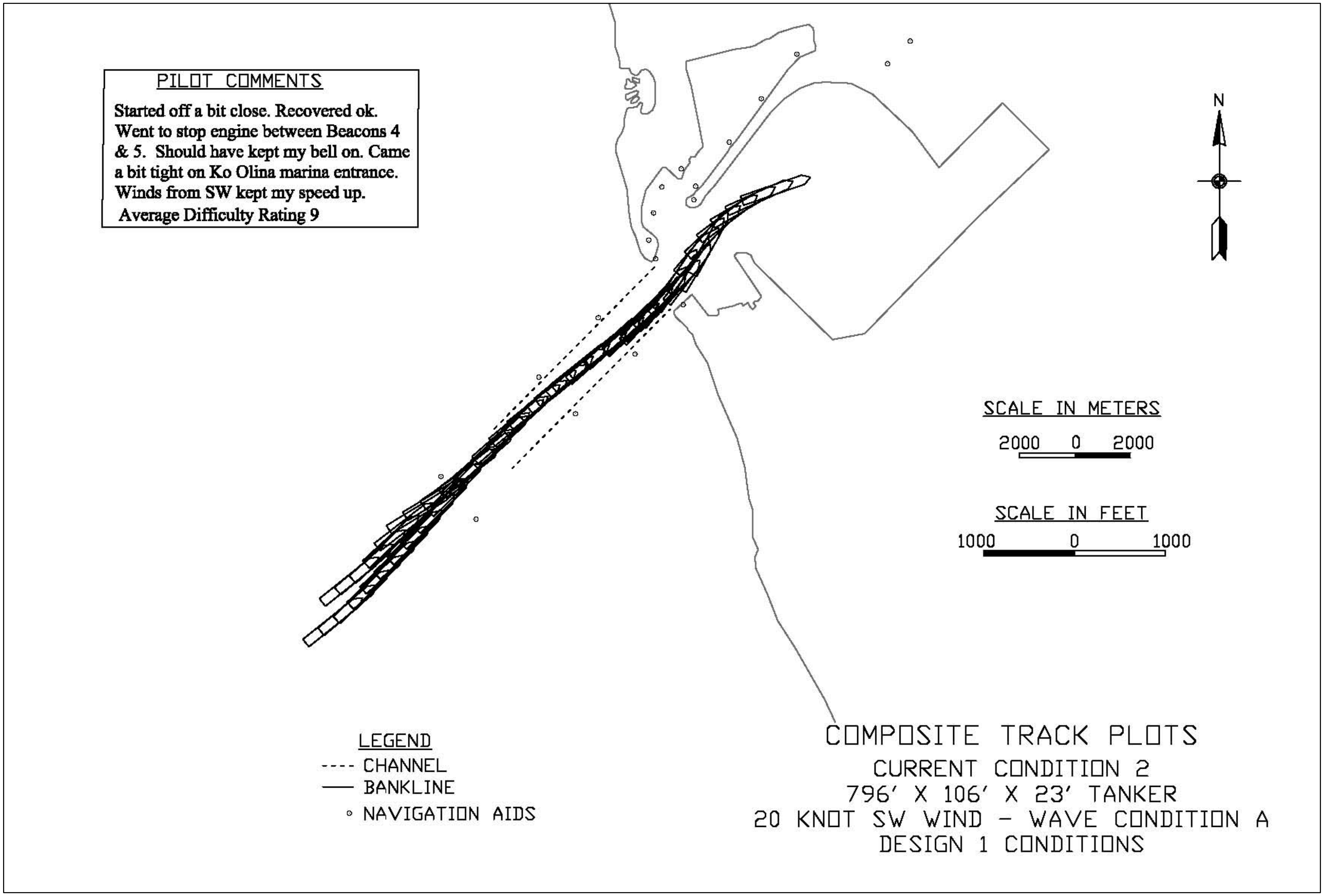
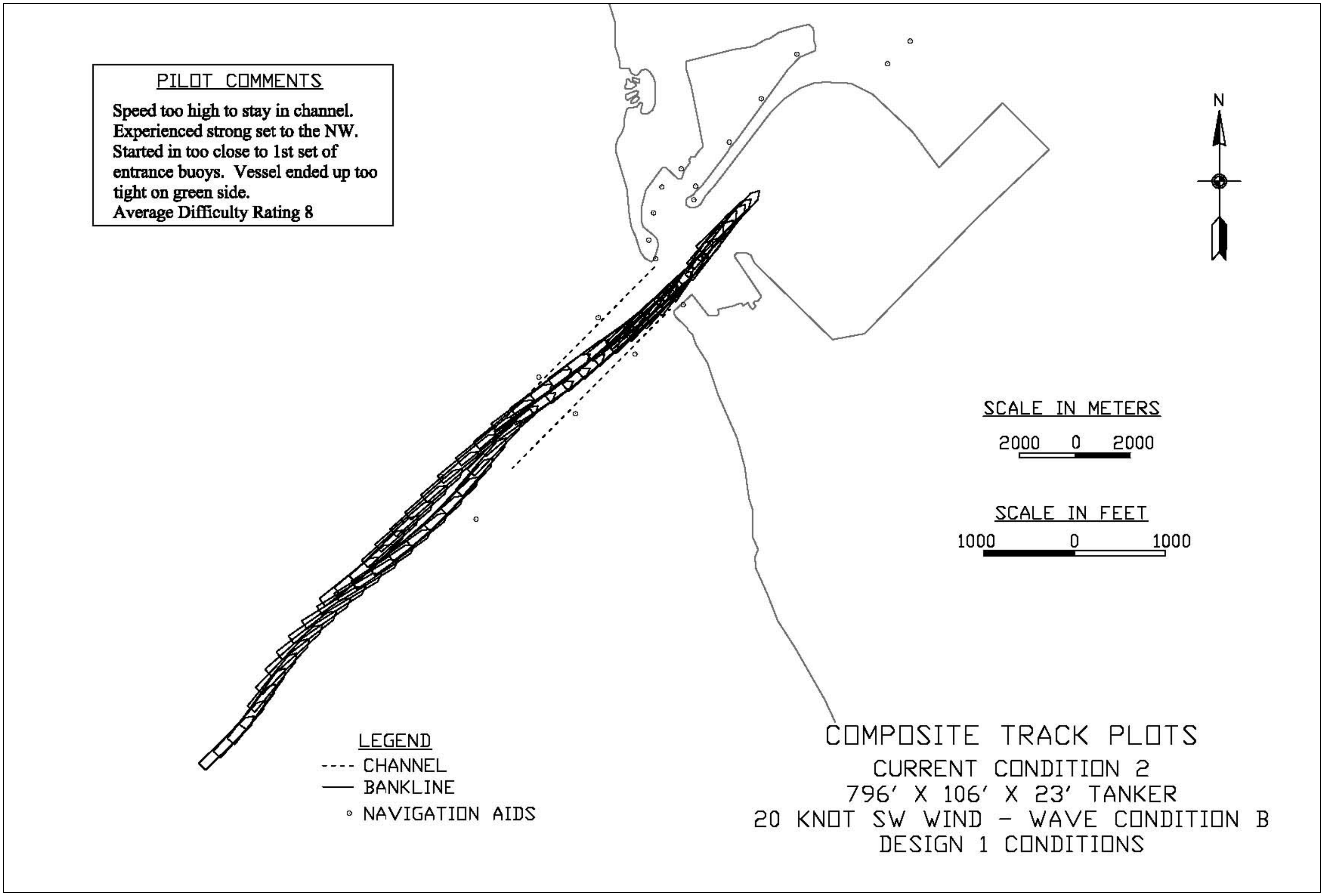
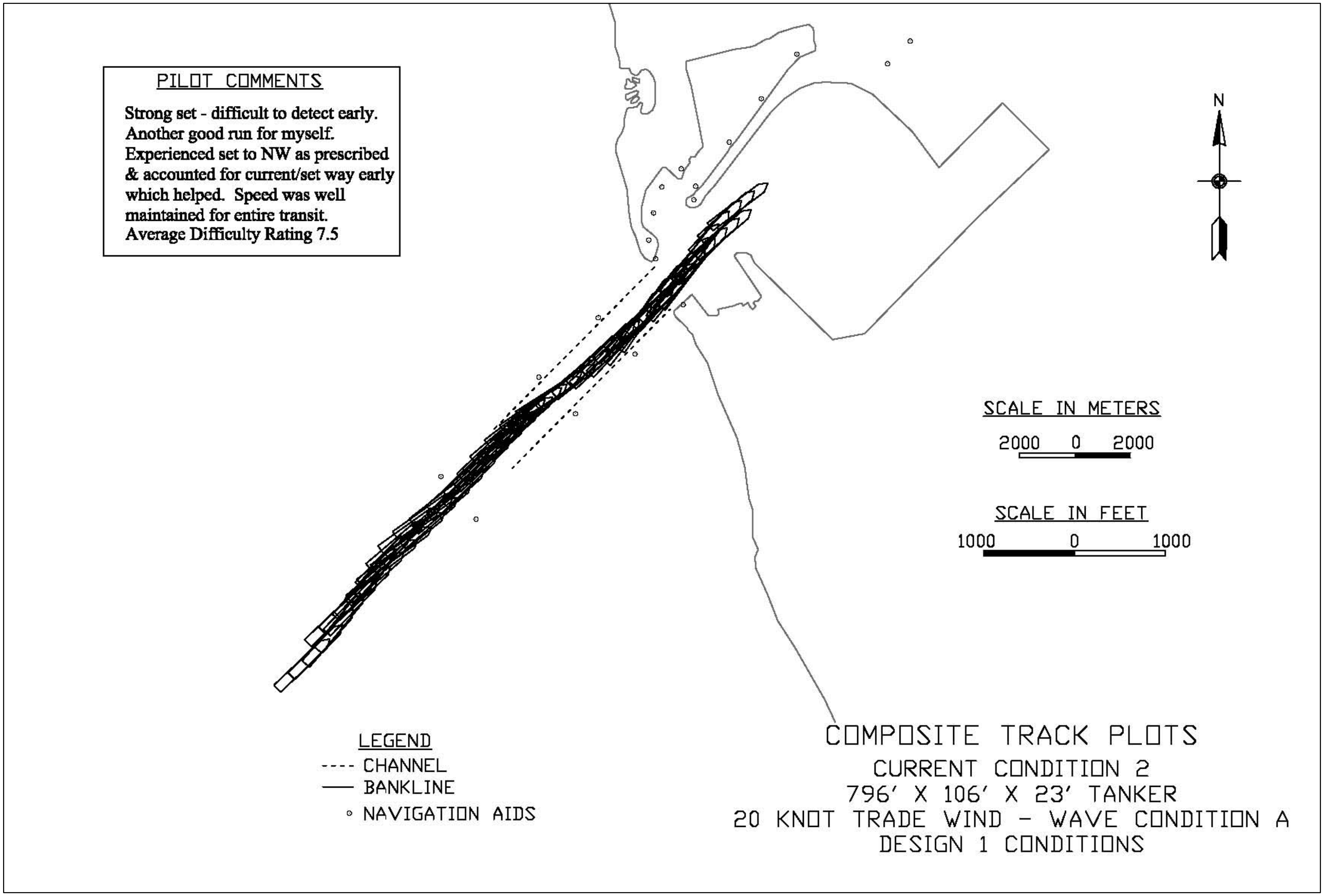
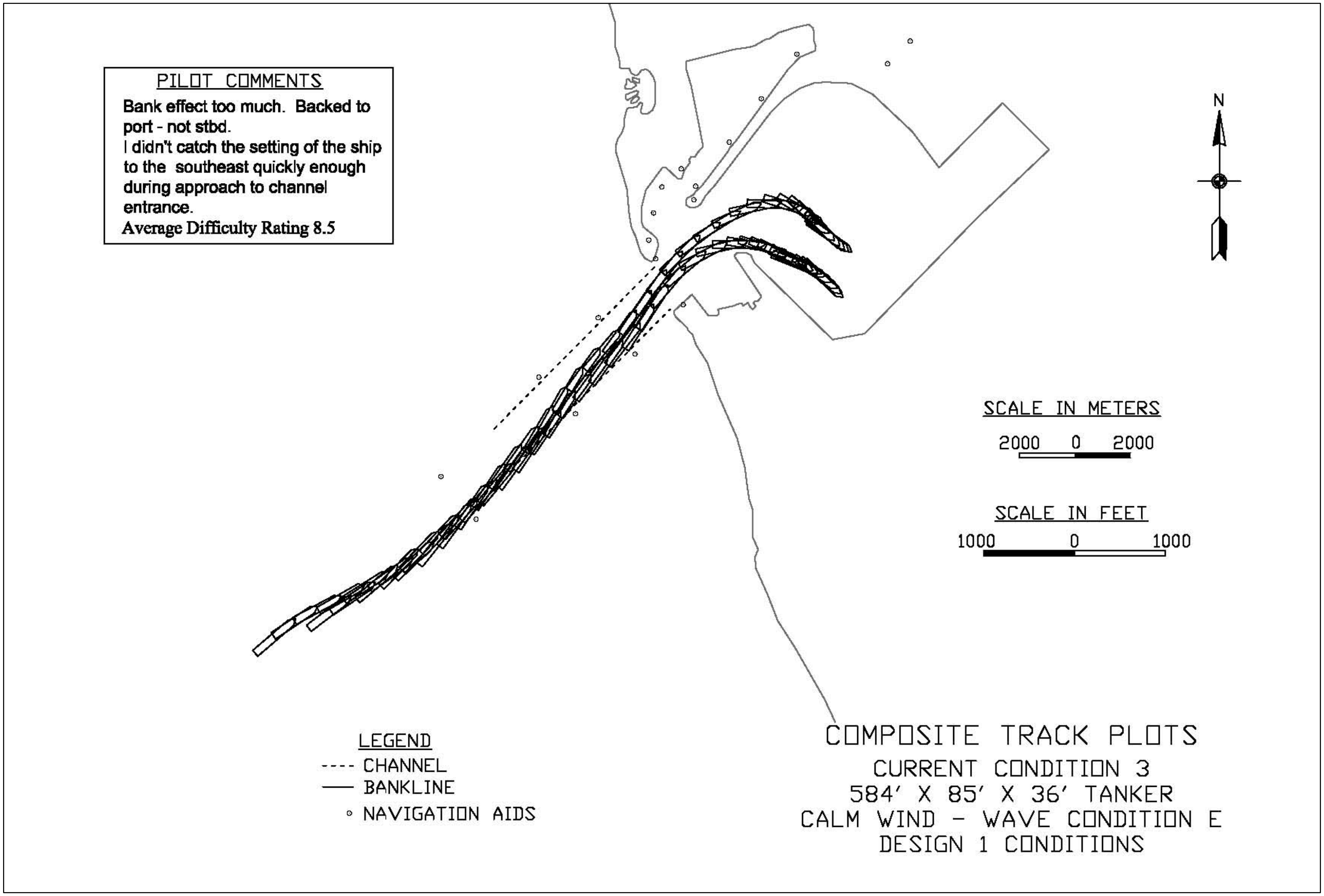

PILOT COMMENTS
Bank effect too much at entrance.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS

Plate 33


PILOT COMMENTS
Started off a bit close. Recovered ok. Went to stop engine between Beacons 4 & 5. Should have kept my bell on. Came a bit tight on Ko Olina marina entrance. Winds from SW kept my speed up.
Average Difficulty Rating 9
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
796' X 106' X 23' TANKER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS


PILOT COMMENTS
Speed too high to stay in channel.
Experienced strong set to the NW.
Started in too close to 1st set of
entrance buoys. Vessel ended up too
tight on green side.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
796' X 106' X 23' TANKER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 1 CONDITIONS

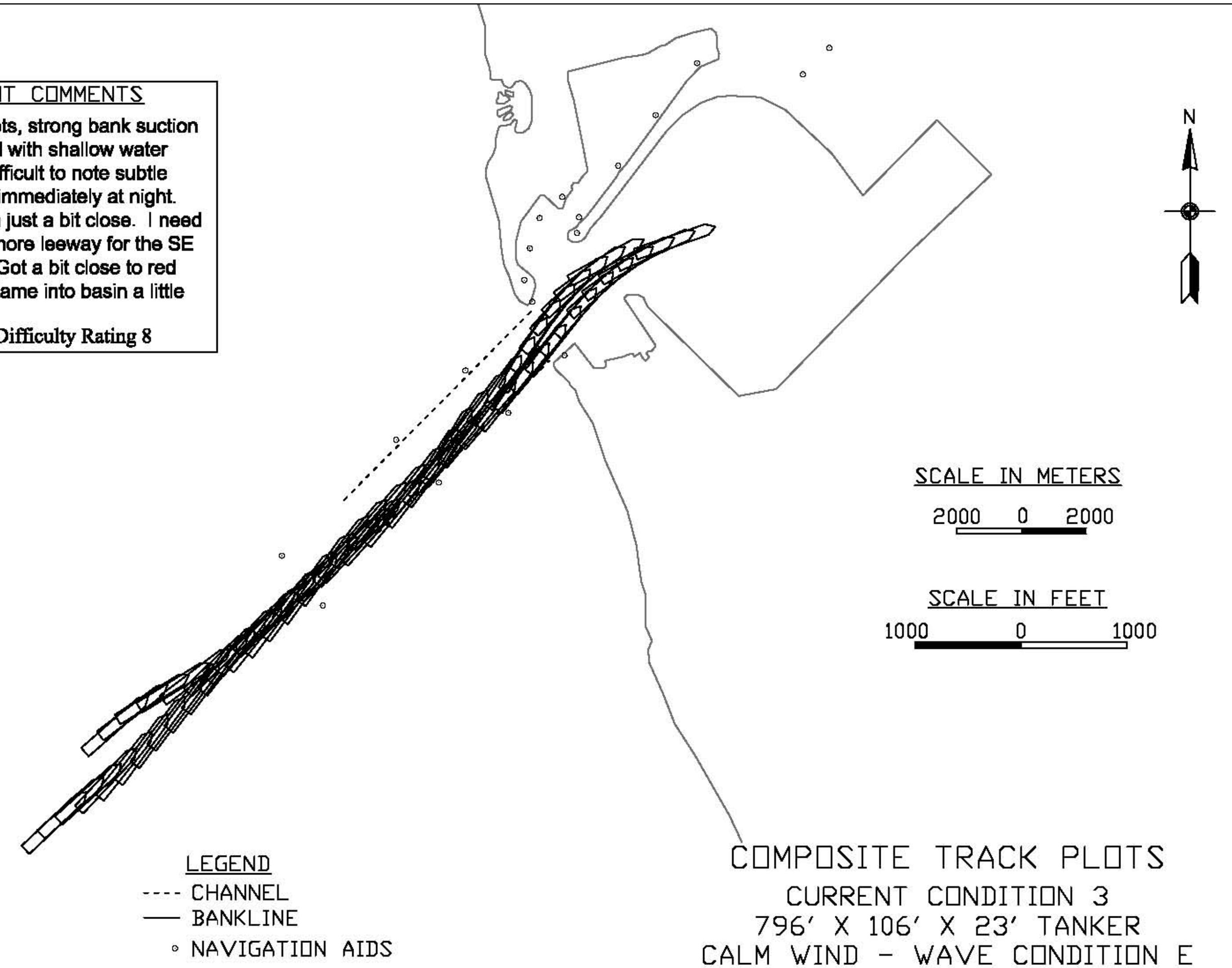

PILOT COMMENTS
Strong set - difficult to detect early.
Another good run for myself.
Experienced set to NW as prescribed
& accounted for current/set way early
which helped. Speed was well
maintained for entire transit.
Average Difficulty Rating 7.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
796' X 106' X 23' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS


PILOT COMMENTS
Bank effect too much. Backed to port - not stbd.
I didn't catch the setting of the ship to the southeast quickly enough during approach to channel entrance.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
CALM WIND - WAVE CONDITION E
DESIGN 1 CONDITIONS

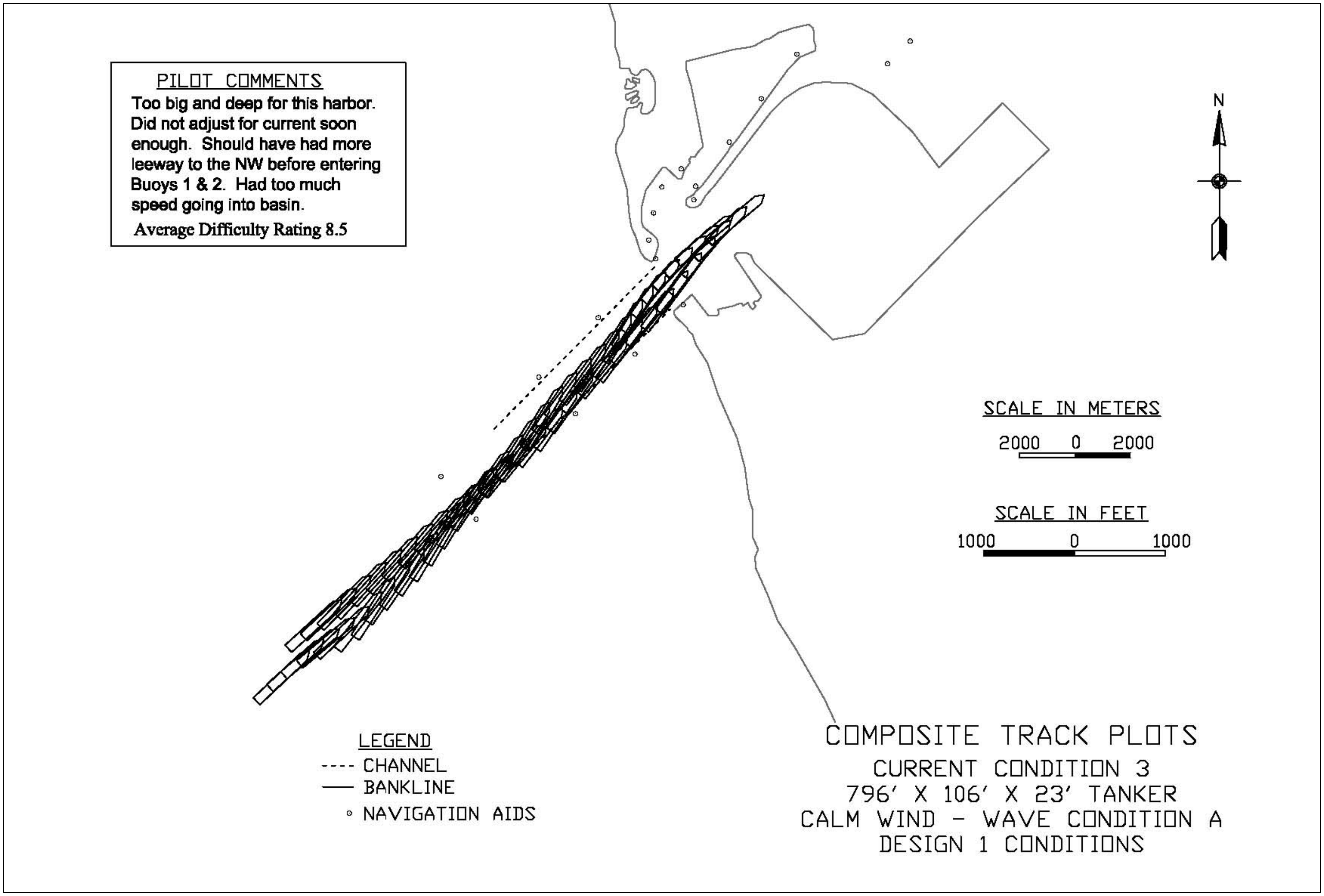
PILOT COMMENTS

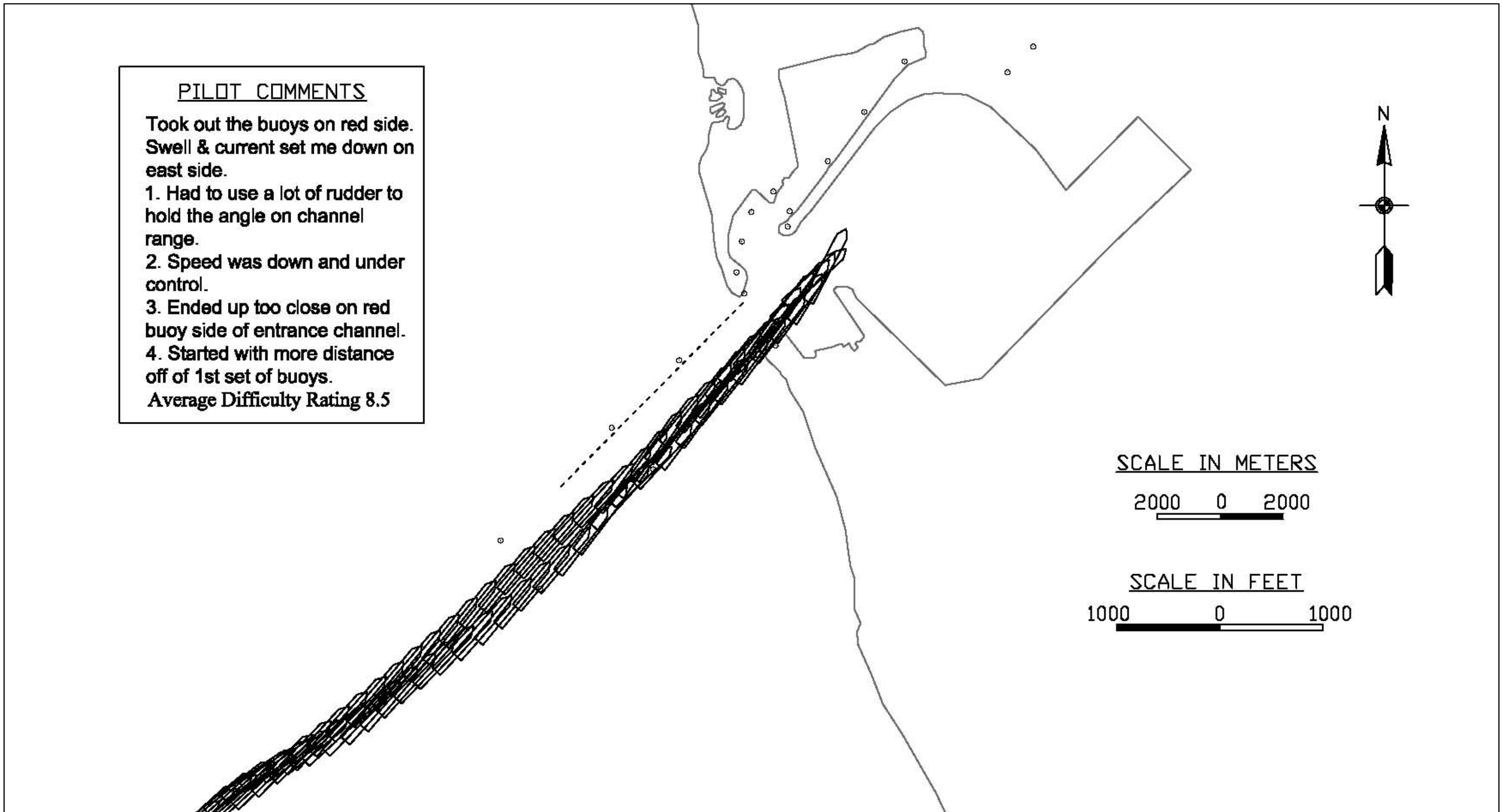
At 5+ knots, strong bank suction combined with shallow water effect - difficult to note subtle changes immediately at night. Started in just a bit close. I need to allow more leeway for the SE current. Got a bit close to red buoys. Came into basin a little fast.

Average Difficulty Rating 8

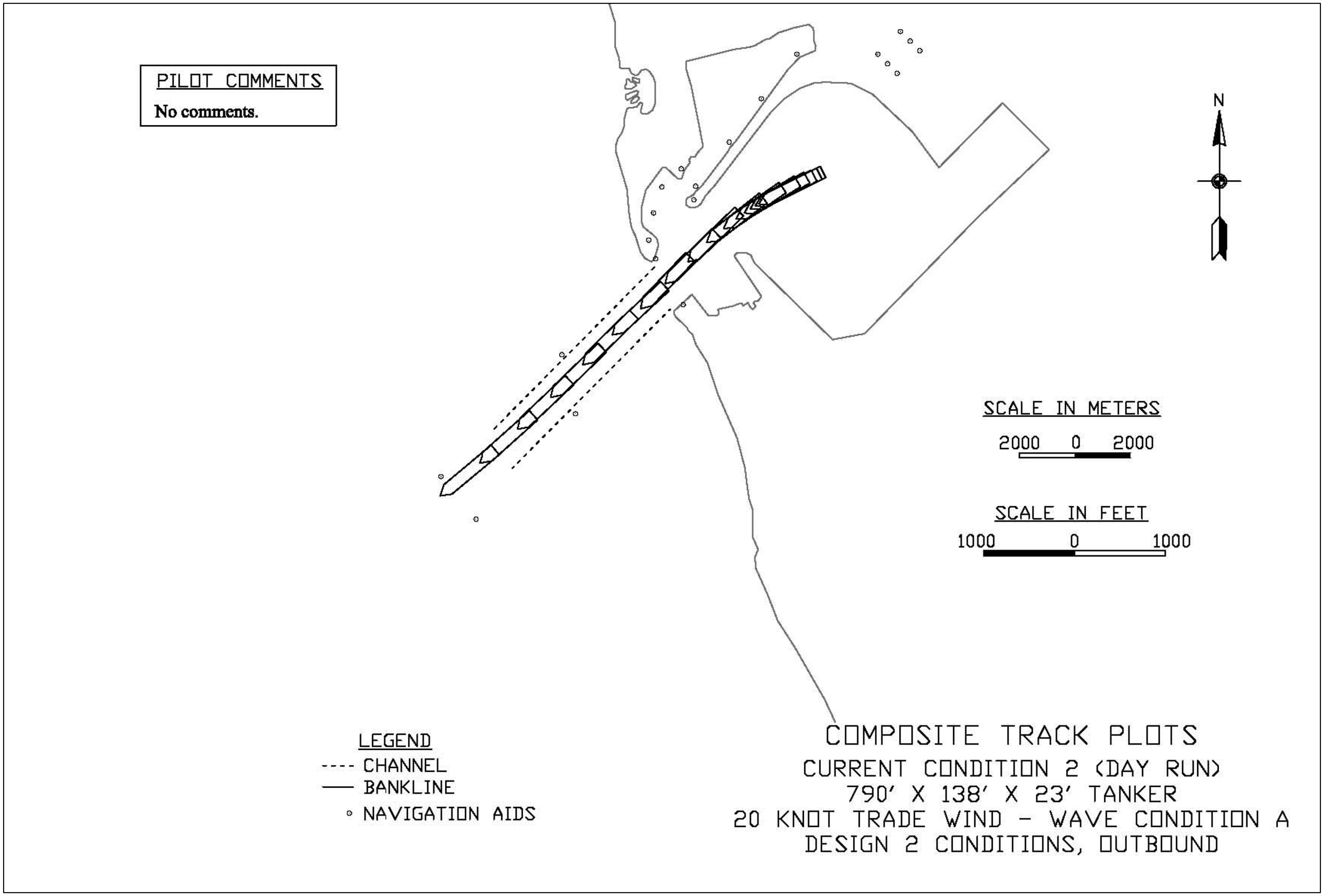


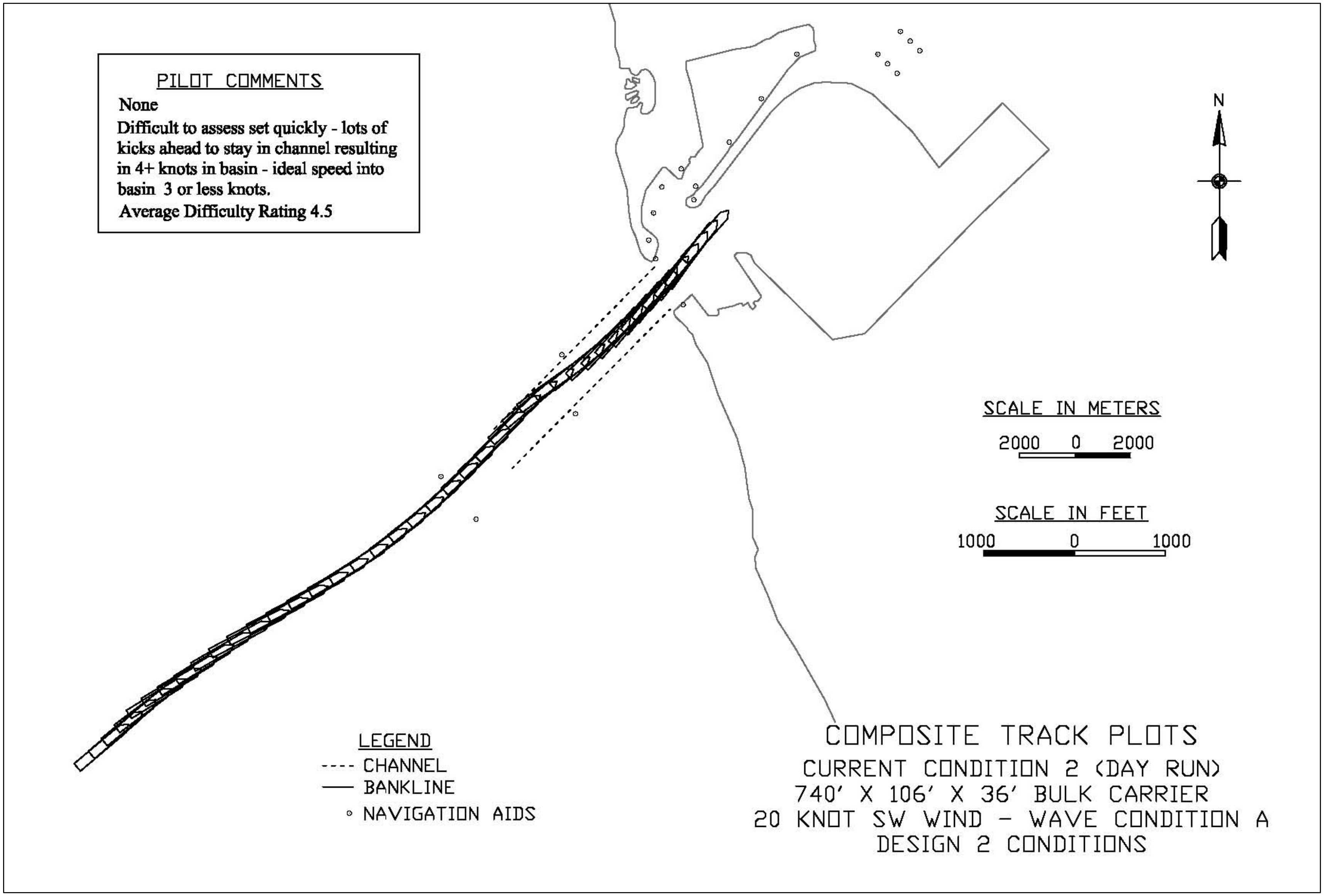
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
796′ X 106′ X 23′ TANKER
CALM WIND – WAVE CONDITION E
DESIGN 1 CONDITIONS

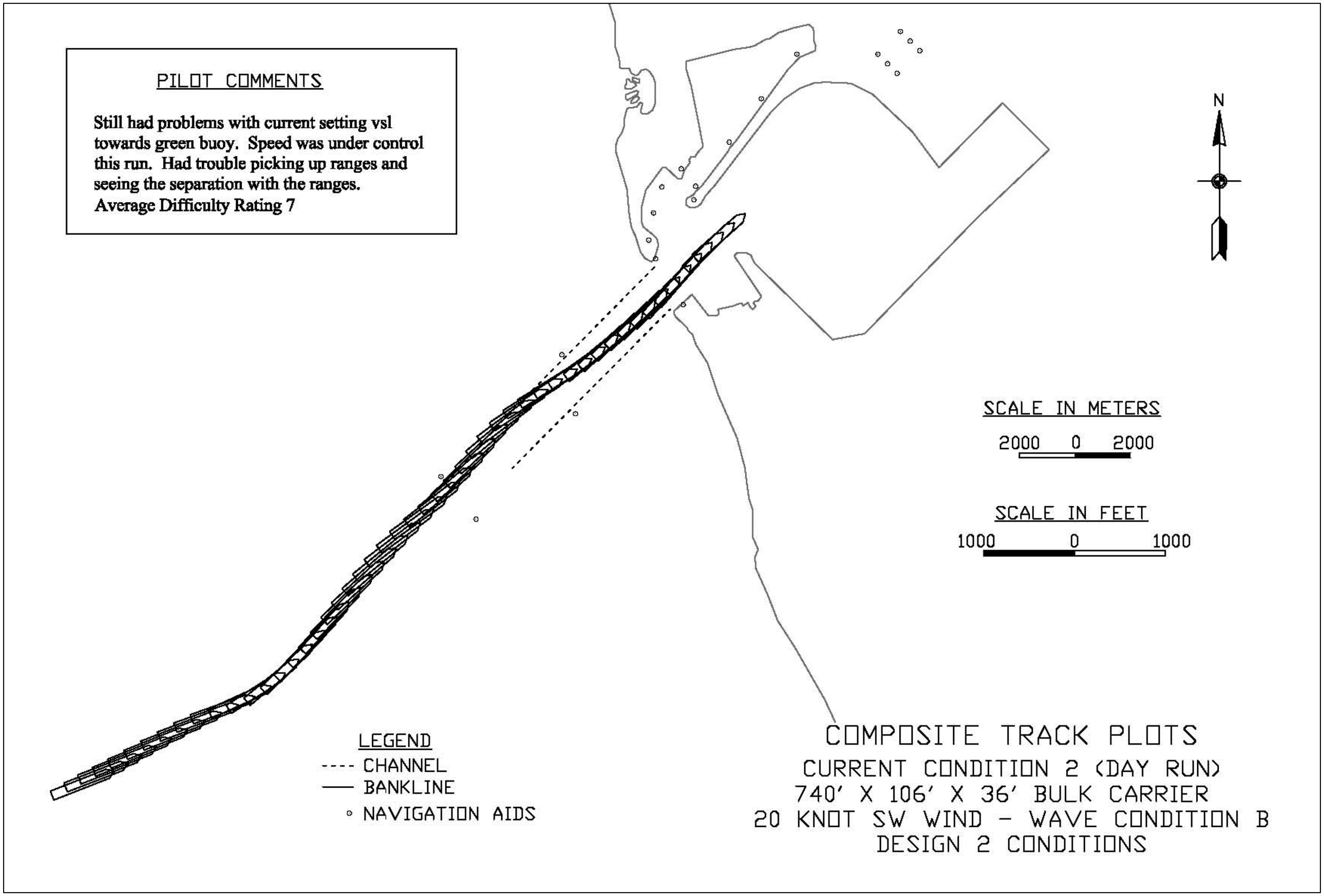

PILOT COMMENTS
Too big and deep for this harbor. Did not adjust for current soon enough. Should have had more leeway to the NW before entering Buoys 1 & 2. Had too much speed going into basin.
Average Difficulty Rating 8.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
796' X 106' X 23' TANKER
CALM WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS



COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
796′ X 106′ X 23′ TANKER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 1 CONDITIONS


PILOT COMMENTS
No comments.
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2 (DAY RUN)
790' X 138' X 23' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS, OUTBOUND


PILOT COMMENTS
None
Difficult to assess set quickly - lots of kicks ahead to stay in channel resulting in 4+ knots in basin - ideal speed into basin 3 or less knots.
Average Difficulty Rating 4.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2 (DAY RUN)
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

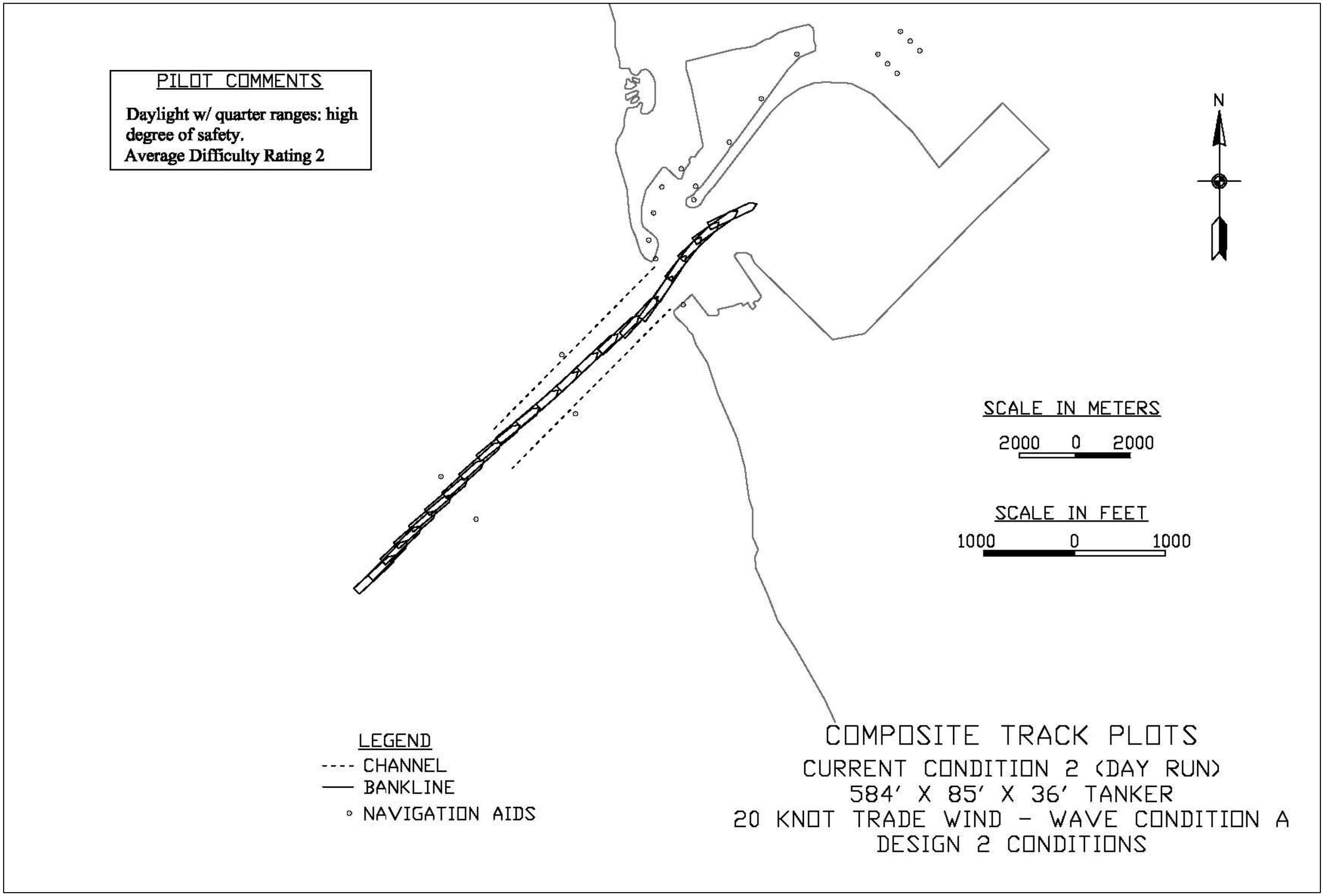


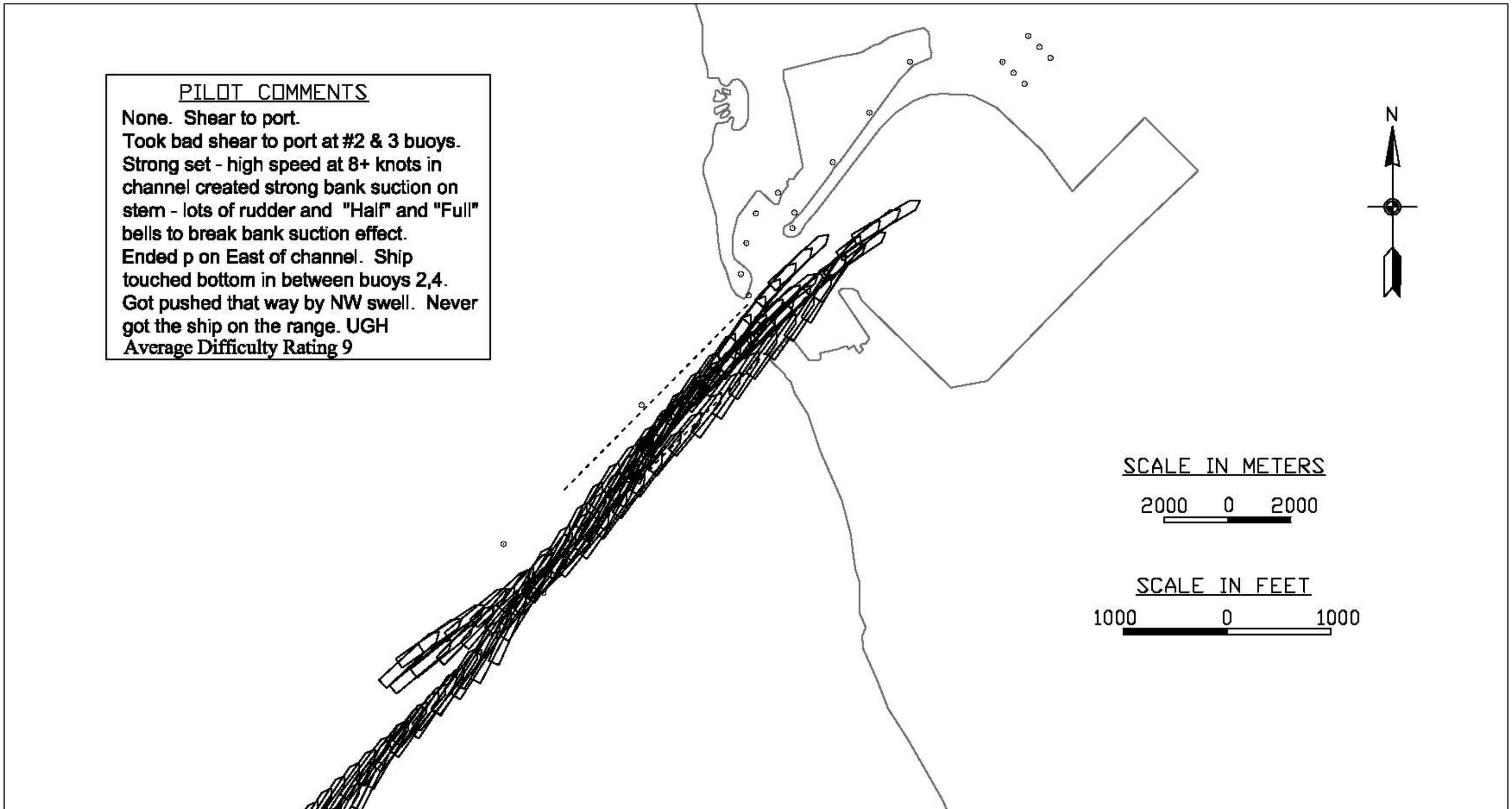
PILOT COMMENTS

Still had problems with current setting vsl towards green buoy. Speed was under control this run. Had trouble picking up ranges and seeing the separation with the ranges.
Average Difficulty Rating 7

COMPOSITE TRACK PLOTS
CURRENT CONDITION 2 (DAY RUN)
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 2 CONDITIONS

Plate 43


PILOT COMMENTS
Daylight w/ quarter ranges: high degree of safety.
Average Difficulty Rating 2
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2 (DAY RUN)
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS



COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

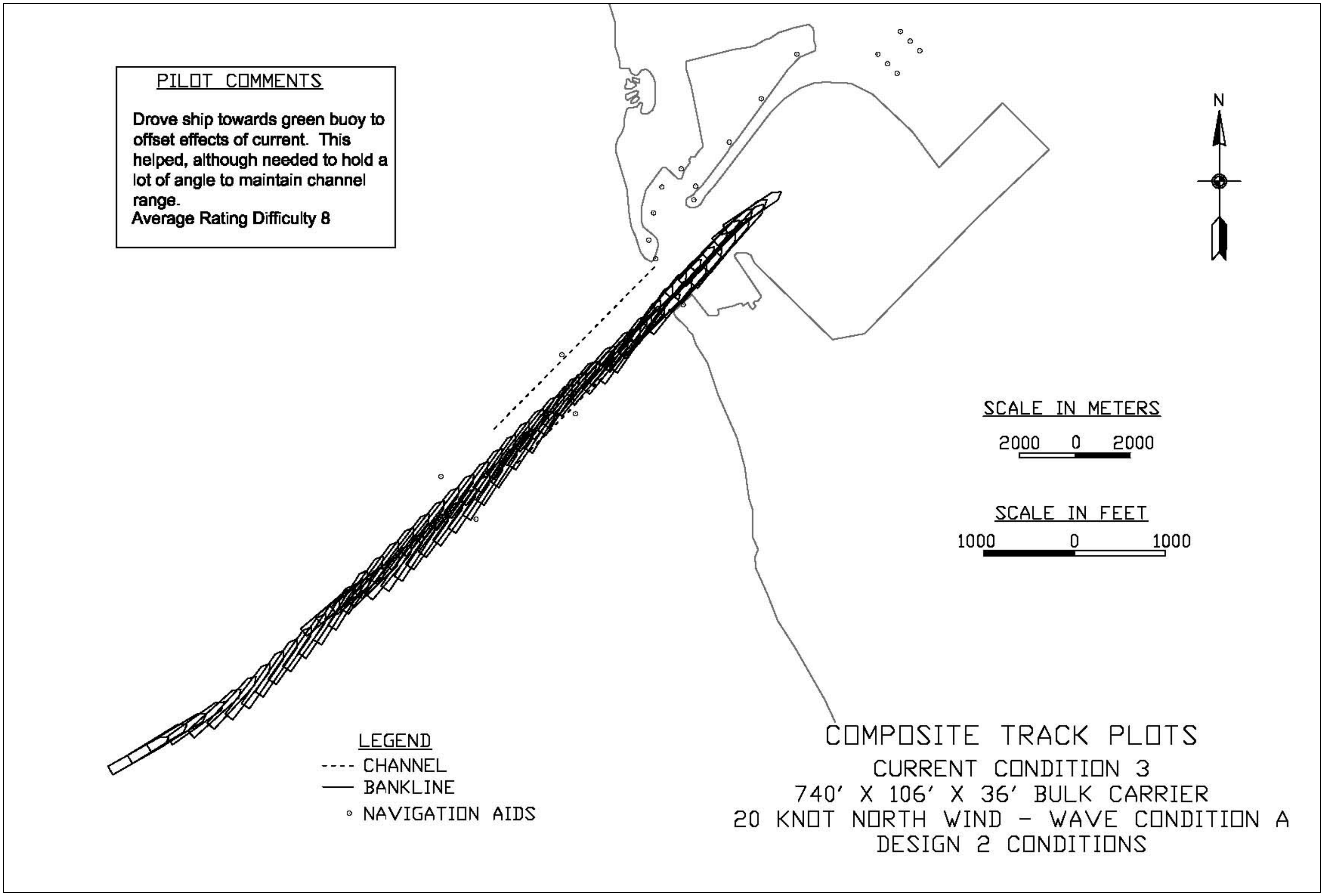
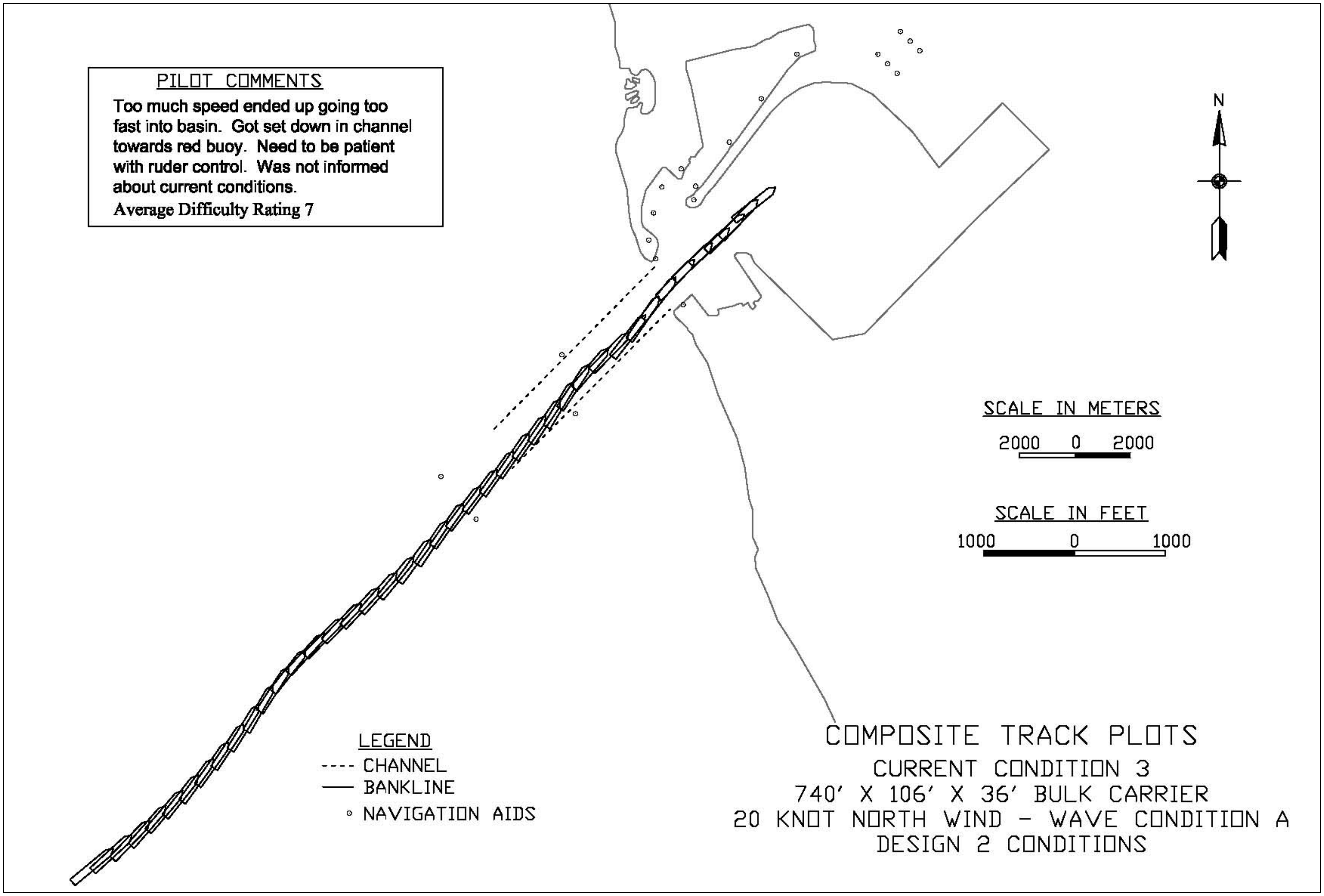
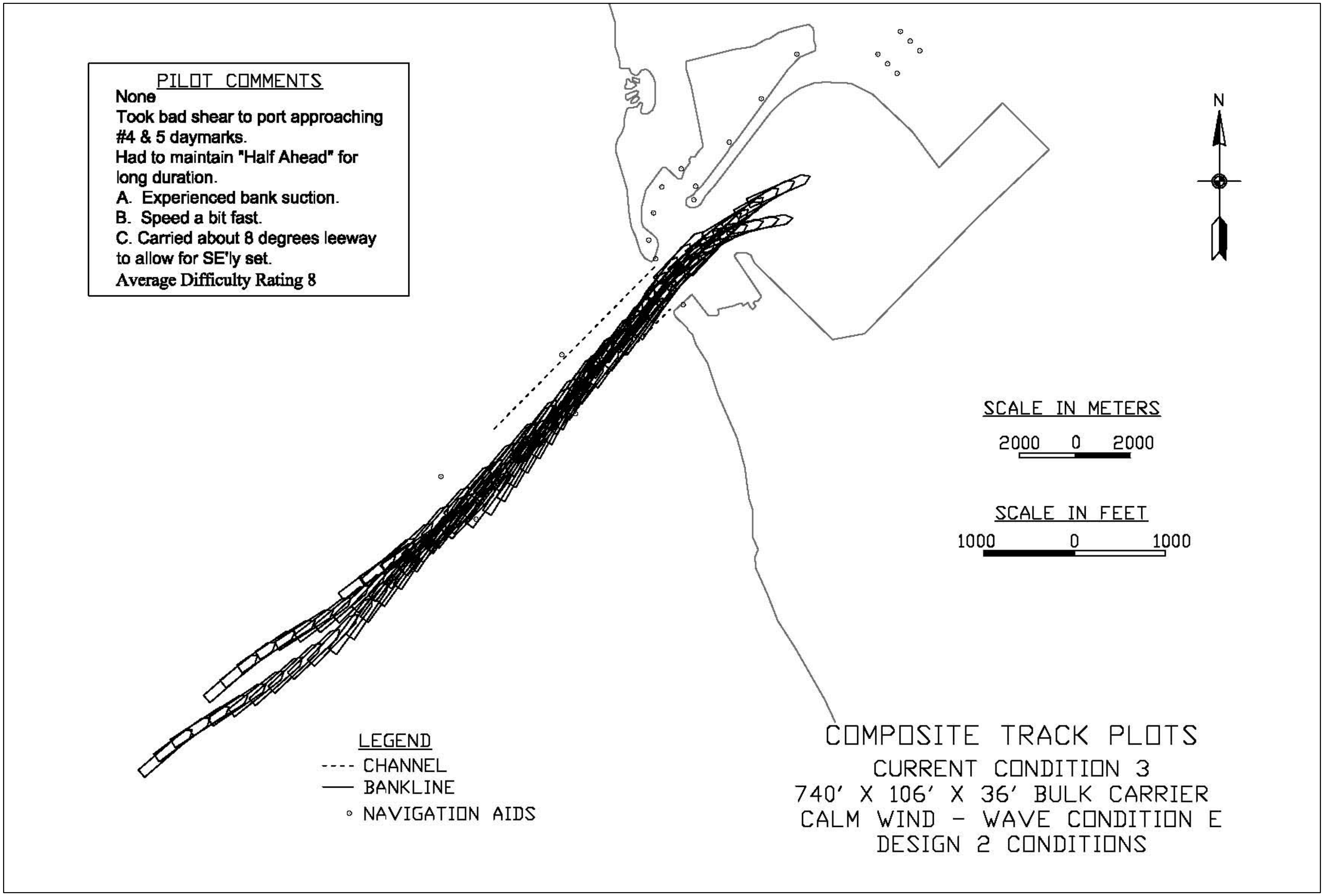
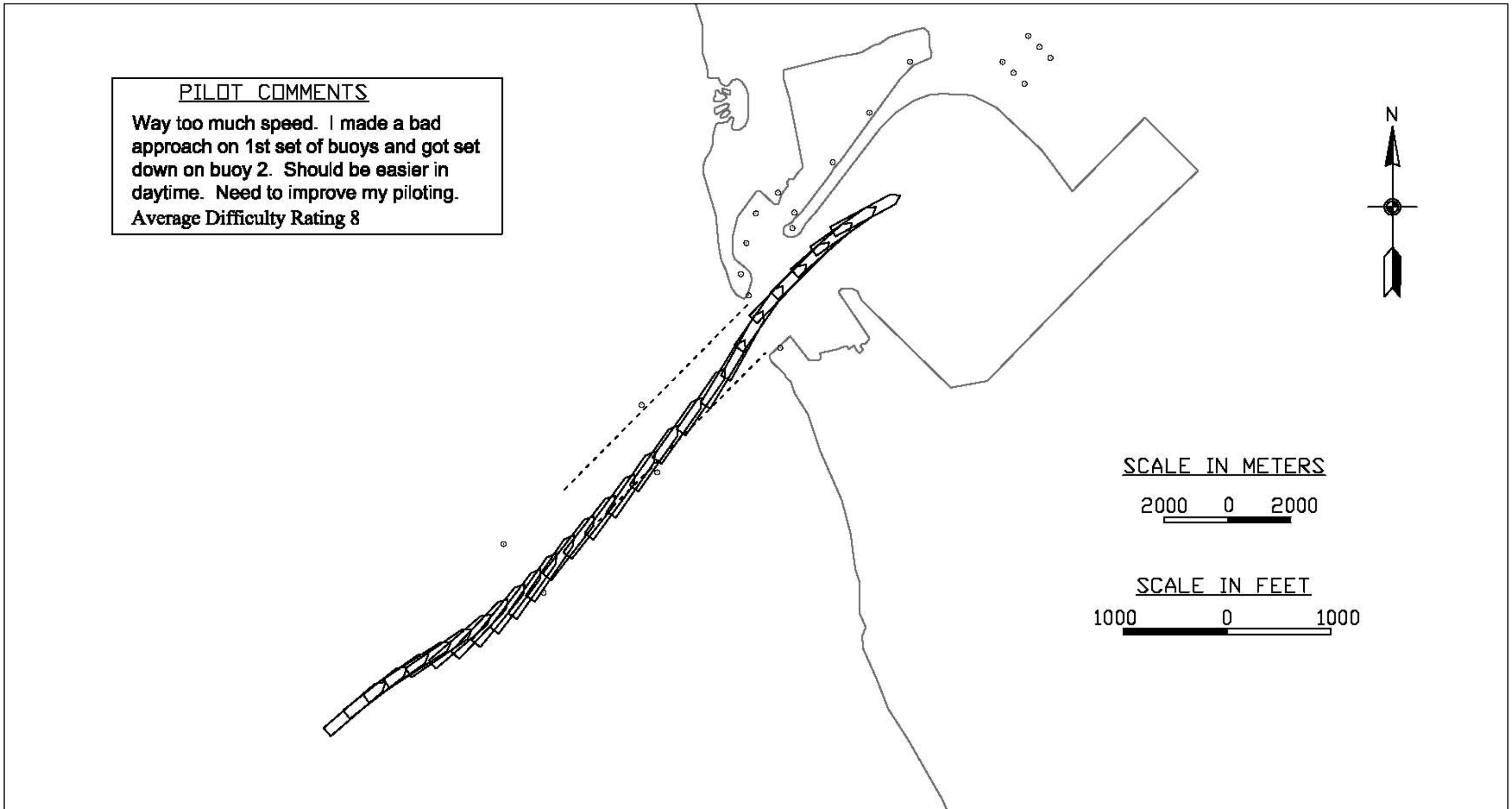

PILOT COMMENTS
Drove ship towards green buoy to offset effects of current. This helped, although needed to hold a lot of angle to maintain channel range.
Average Rating Difficulty 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

Plate 46


PILOT COMMENTS
Too much speed ended up going too fast into basin. Got set down in channel towards red buoy. Need to be patient with ruder control. Was not informed about current conditions.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS


PILOT COMMENTS
None
Took bad shear to port approaching #4 & 5 daymarks.
Had to maintain "Half Ahead" for long duration.
A. Experienced bank suction.
B. Speed a bit fast.
C. Carried about 8 degrees leeway to allow for SE'ly set.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION E
DESIGN 2 CONDITIONS



COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION E
DESIGN 2 CONDITIONS

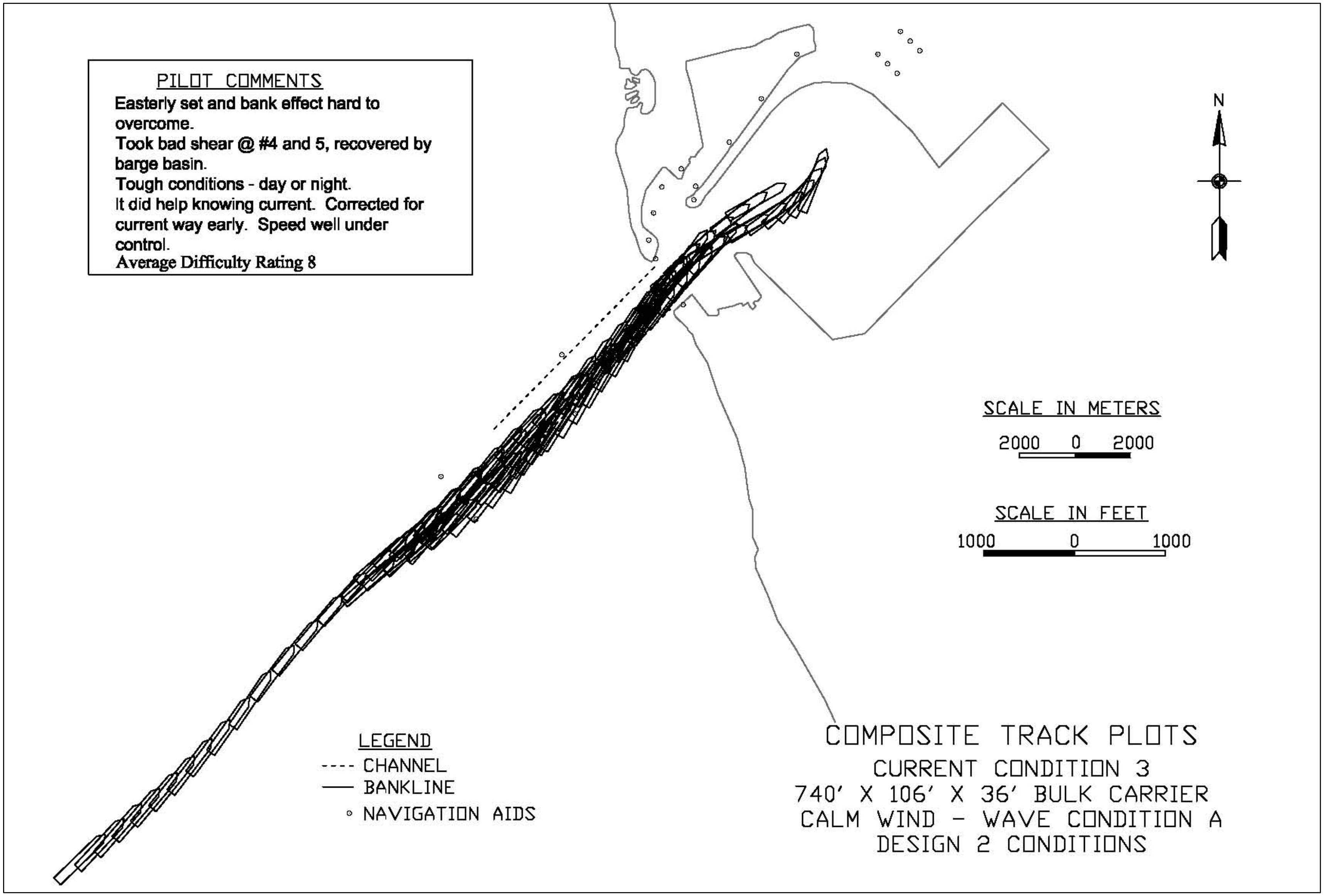
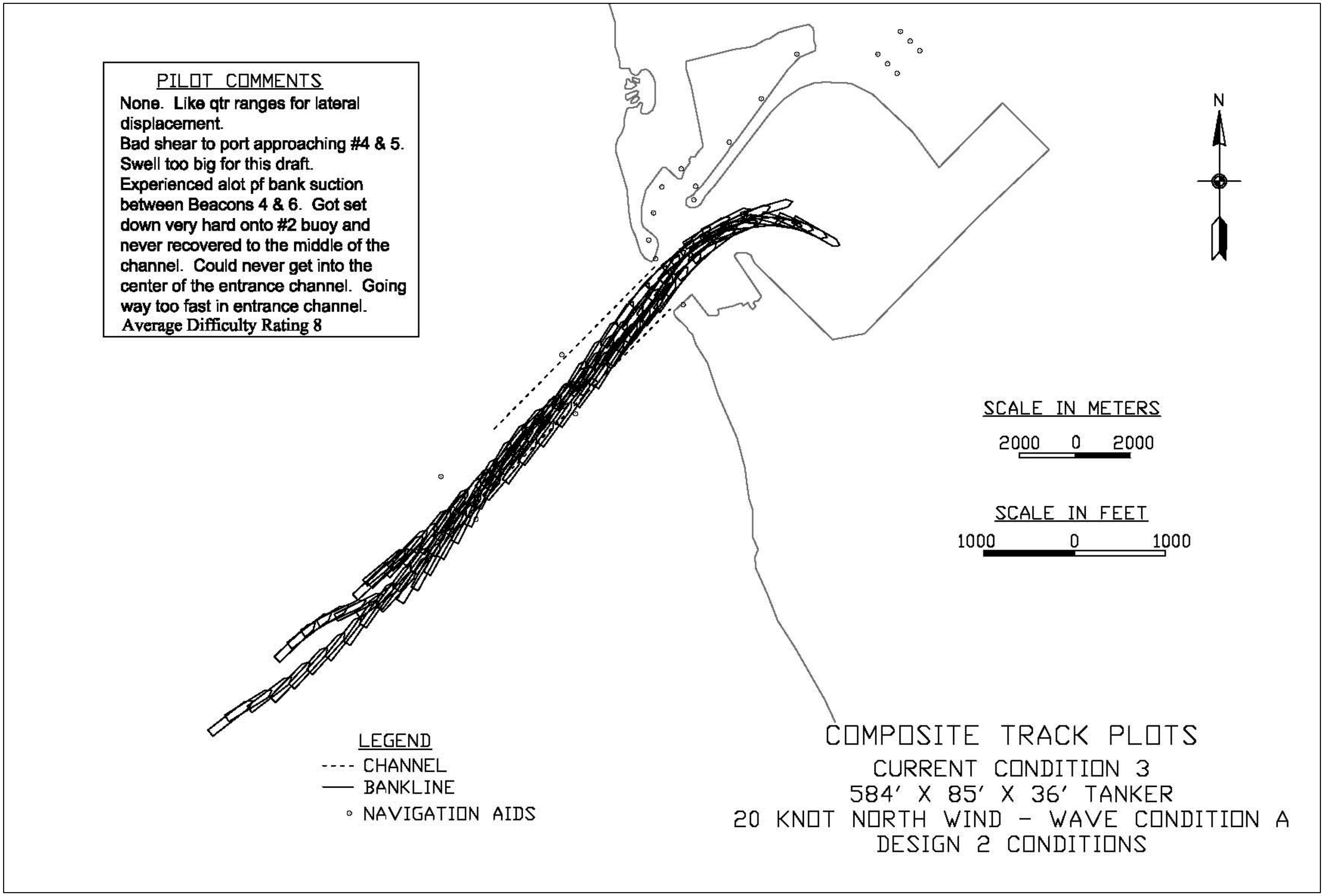
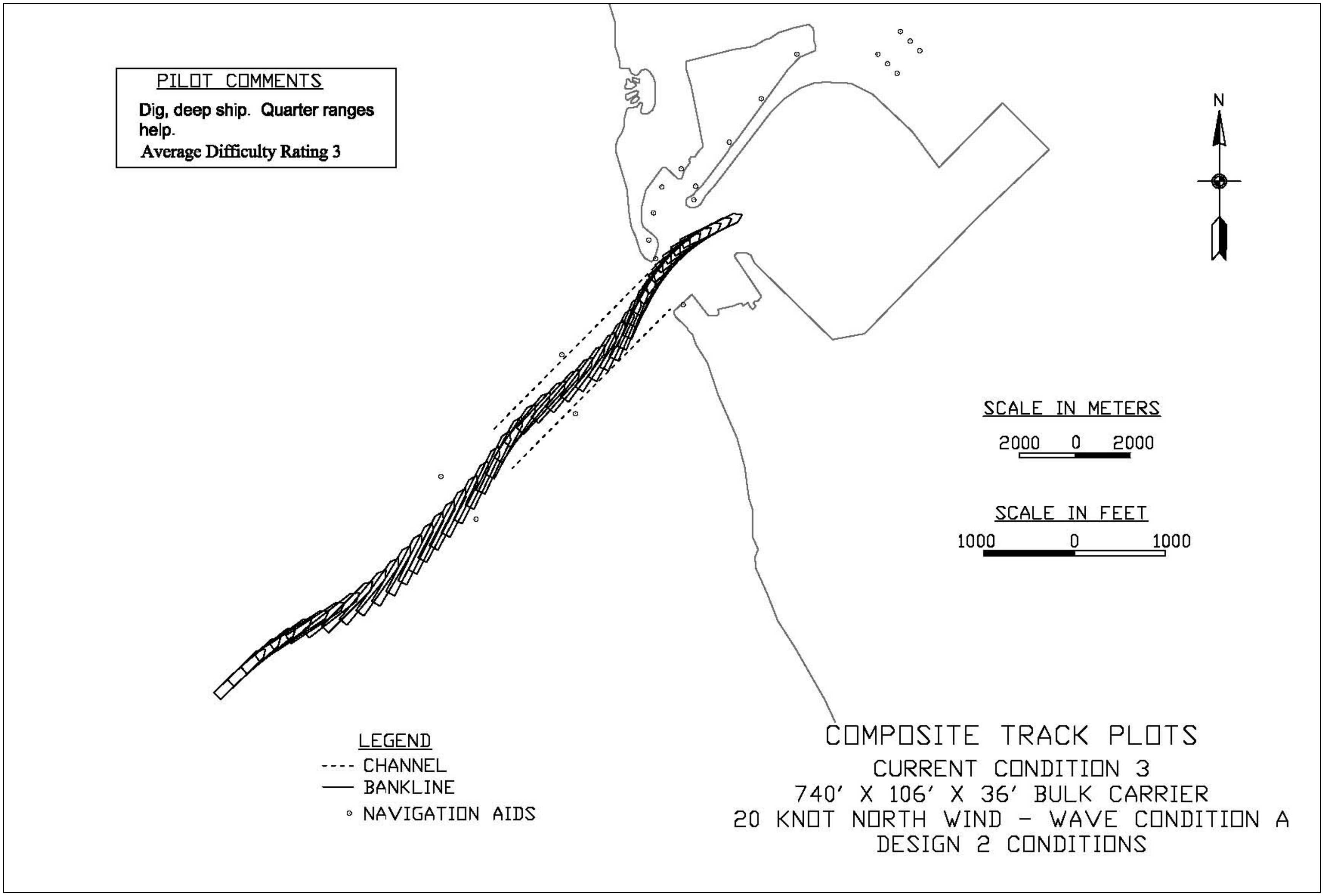
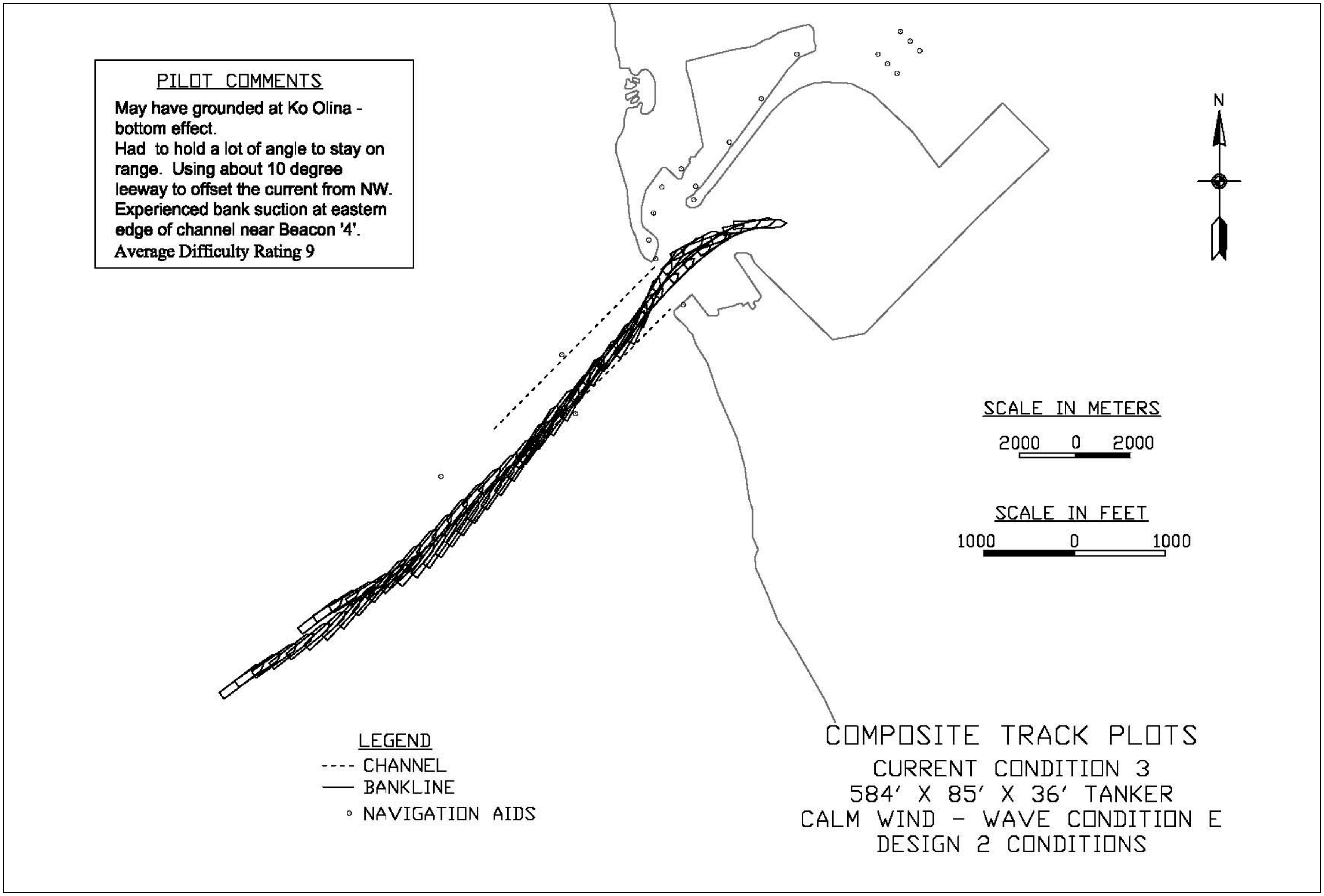

PILOT COMMENTS
Easterly set and bank effect hard to overcome.
Took bad shear @ #4 and 5, recovered by barge basin.
Tough conditions - day or night.
It did help knowing current. Corrected for current way early. Speed well under control.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
CALM WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

Plate 50


PILOT COMMENTS
None. Like qtr ranges for lateral displacement.
Bad shear to port approaching #4 & 5.
Swell too big for this draft.
Experienced alot pf bank suction between Beacons 4 & 6. Got set down very hard onto #2 buoy and never recovered to the middle of the channel. Could never get into the center of the entrance channel. Going way too fast in entrance channel.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS


PILOT COMMENTS
Dig, deep ship. Quarter ranges help.
Average Difficulty Rating 3
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS


PILOT COMMENTS
May have grounded at Ko Olina - bottom effect.
Had to hold a lot of angle to stay on range. Using about 10 degree leeway to offset the current from NW.
Experienced bank suction at eastern edge of channel near Beacon '4'.
Average Difficulty Rating 9
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
CALM WIND - WAVE CONDITION E
DESIGN 2 CONDITIONS

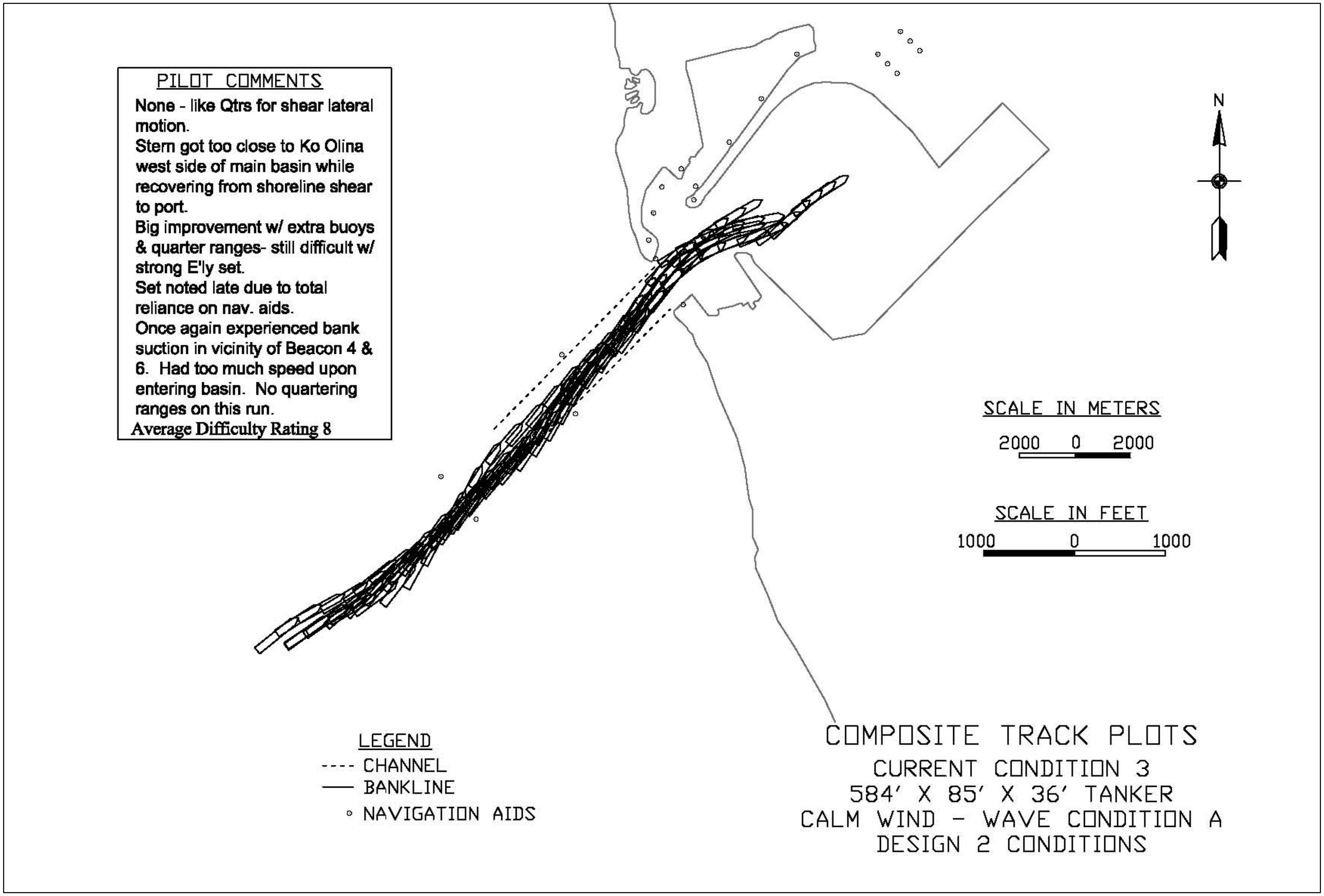

PILOT COMMENTS
None - like Qtrs for shear lateral motion.
Stern got too close to Ko Olina west side of main basin while recovering from shoreline shear to port.
Big improvement w/ extra buoys & quarter ranges- still difficult w/ strong E'ly set.
Set noted late due to total reliance on nav. aids.
Once again experienced bank suction in vicinity of Beacon 4 & 6. Had too much speed upon entering basin. No quartering ranges on this run.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
CALM WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

Plate 54

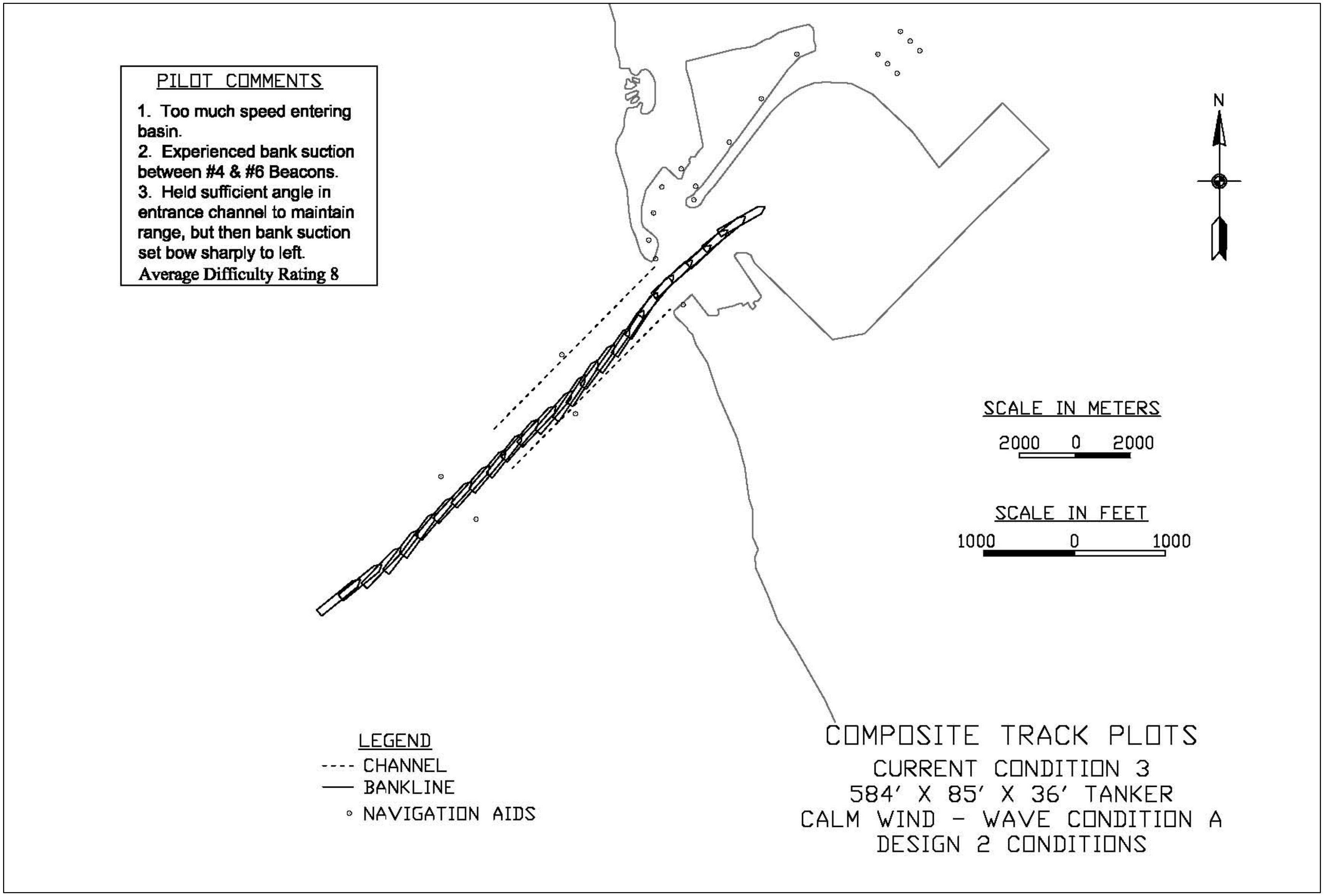
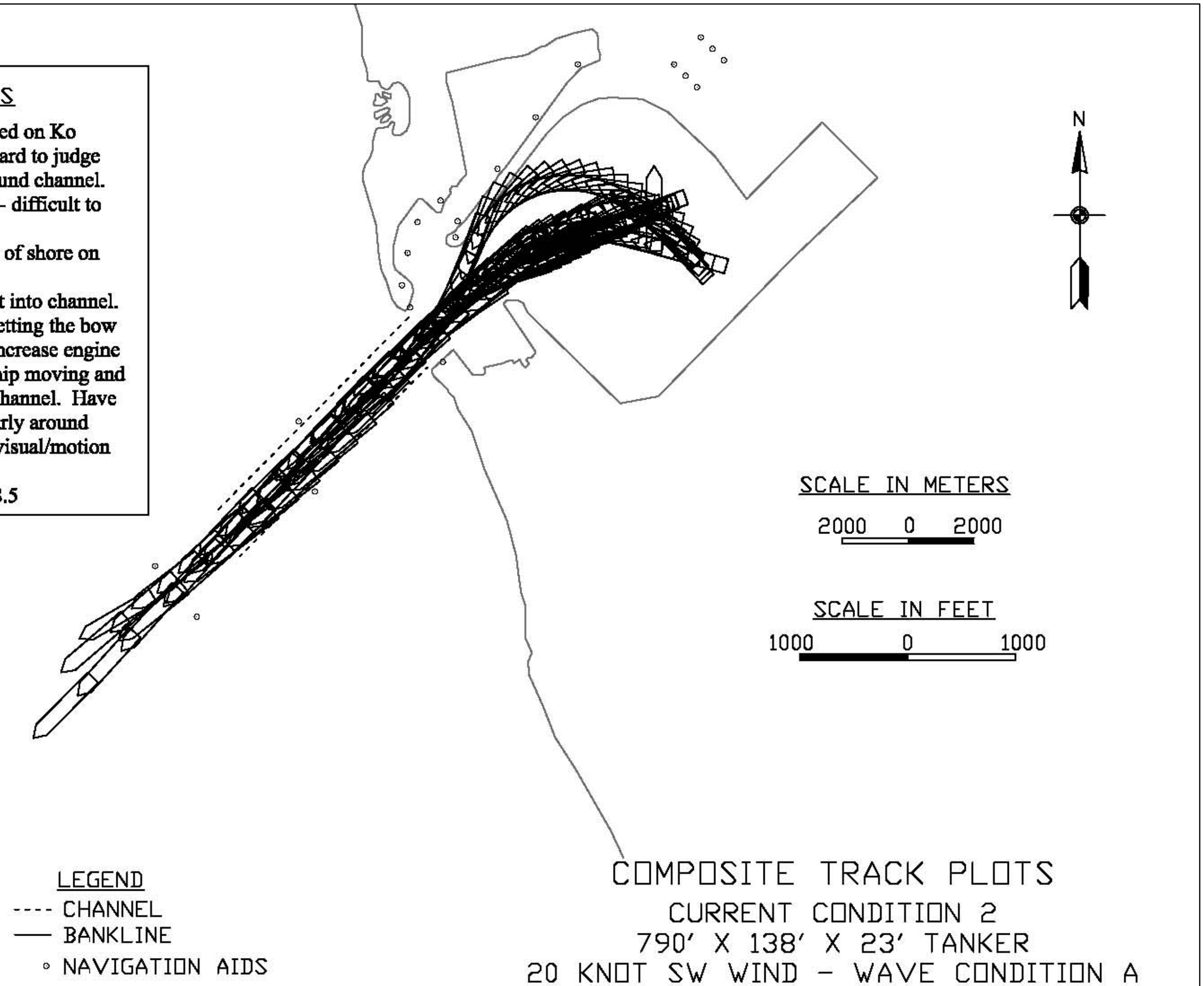

PILOT COMMENTS
1. Too much speed entering basin.
2. Experienced bank suction between #4 & #6 Beacons.
3. Held sufficient angle in entrance channel to maintain range, but then bank suction set bow sharply to left.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584′ X 85′ X 36′ TANKER
CALM WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

Plate 55

PILOT COMMENTS

S/Y jetty lt. needed.Grounded on Ko Olina side of basin. Very hard to judge turn out of basin into outbound channel. No lights on Ko Olina side - difficult to shape up.
S/Y jetty needs lt. Add'l lts of shore on fairway.
Very hard to judge turn port into channel. Strong SW wind affected getting the bow through the wind. Had to increase engine speed to full ahead to get chip moving and prevent being set down in channel. Have to ensure you turn vessel early around drydock buoy. Very good visual/motion effects.
Average Difficulty Rating 8.5



COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
790' X 138' X 23' TANKER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS, OUTBOUND

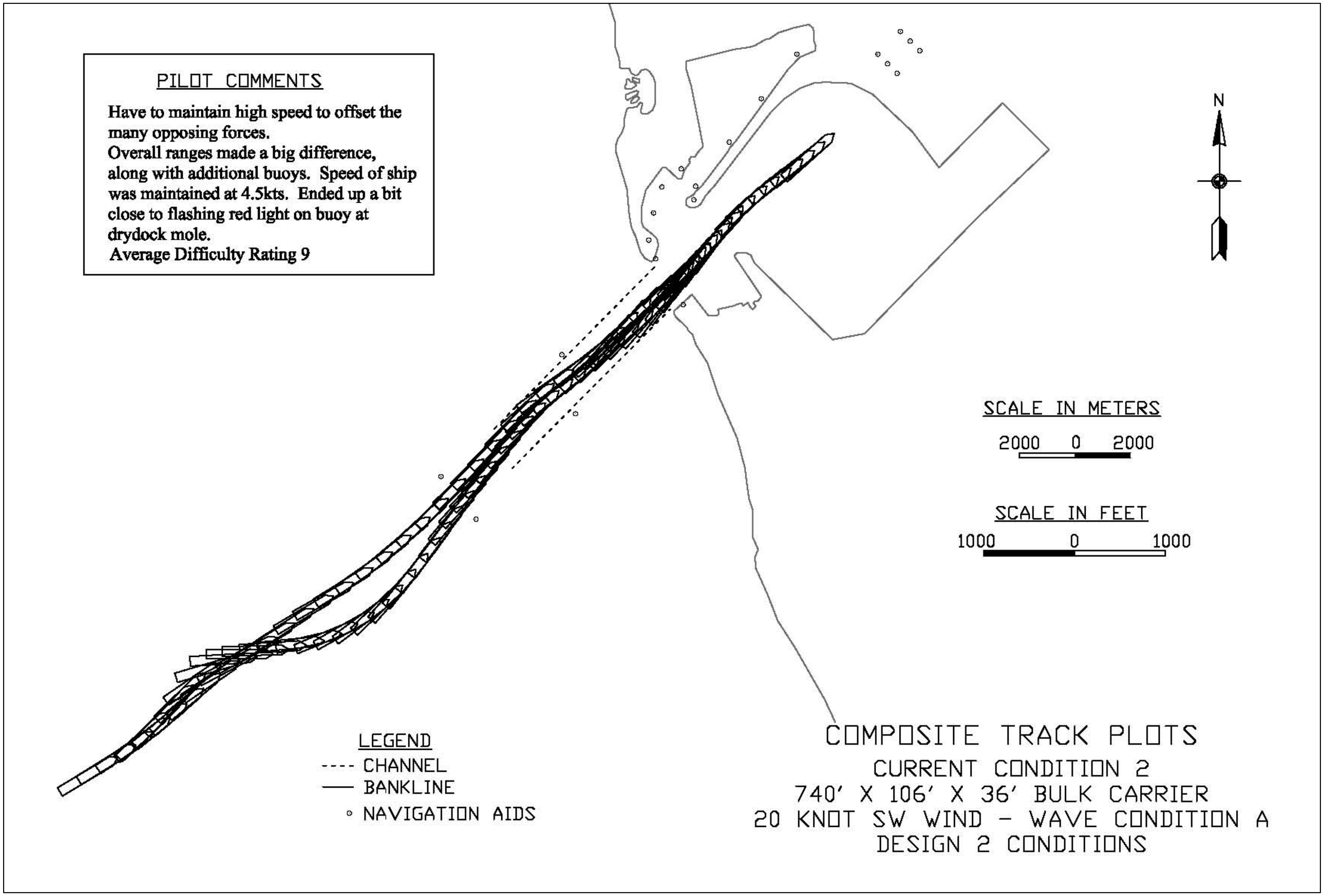
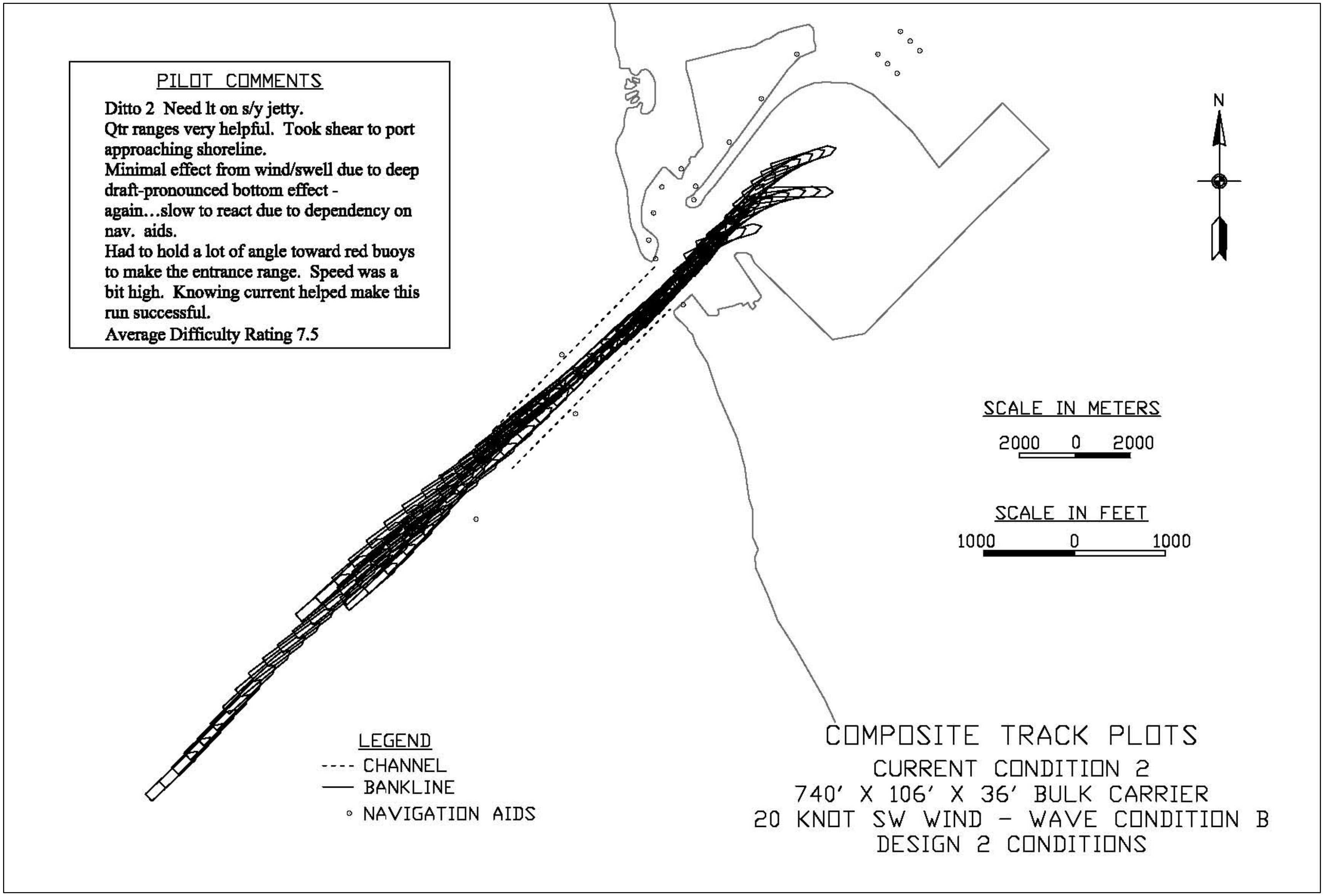
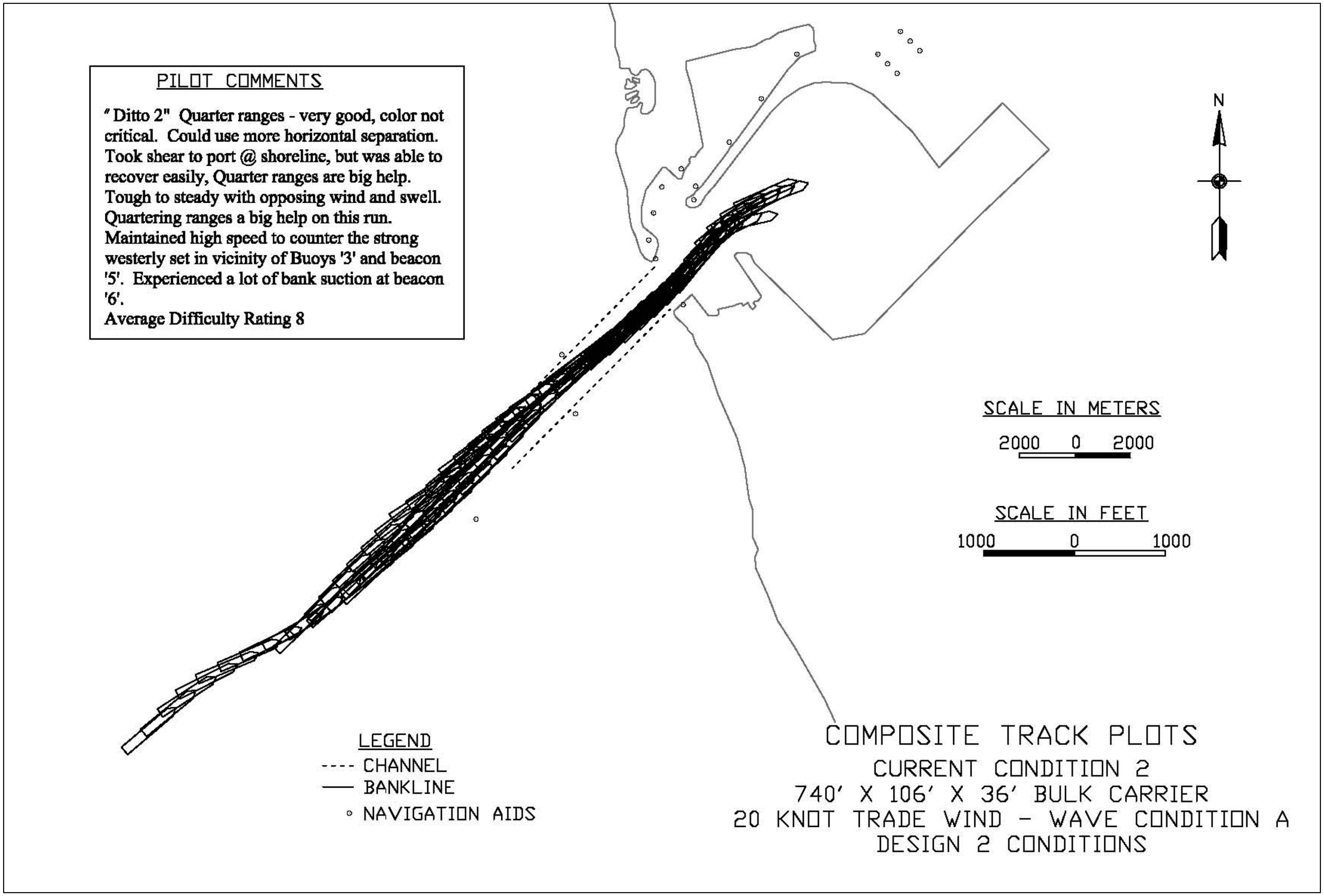
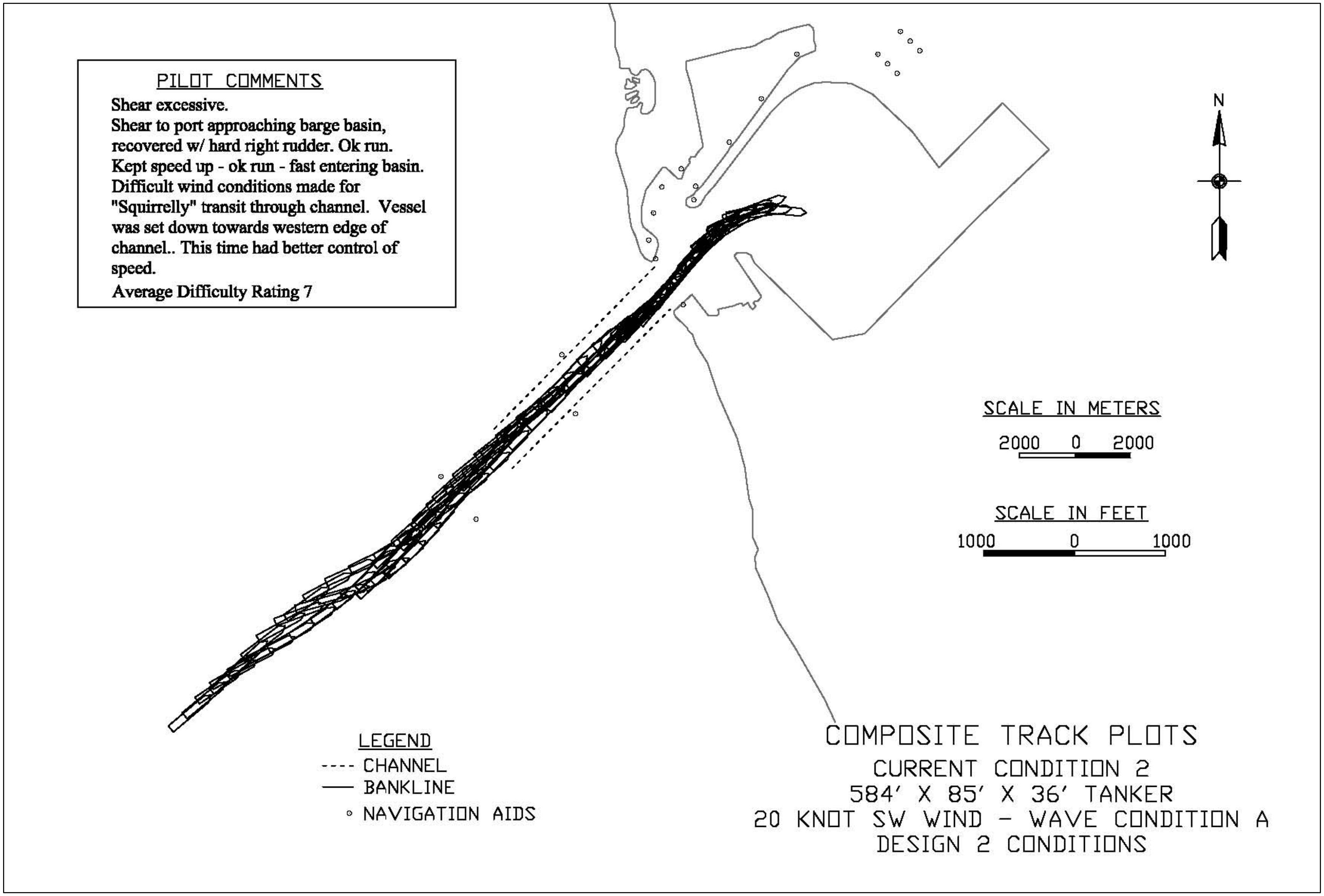

PILOT COMMENTS
Have to maintain high speed to offset the many opposing forces.
Overall ranges made a big difference, along with additional buoys. Speed of ship was maintained at 4.5kts. Ended up a bit close to flashing red light on buoy at drydock mole.
Average Difficulty Rating 9
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

Plate 57

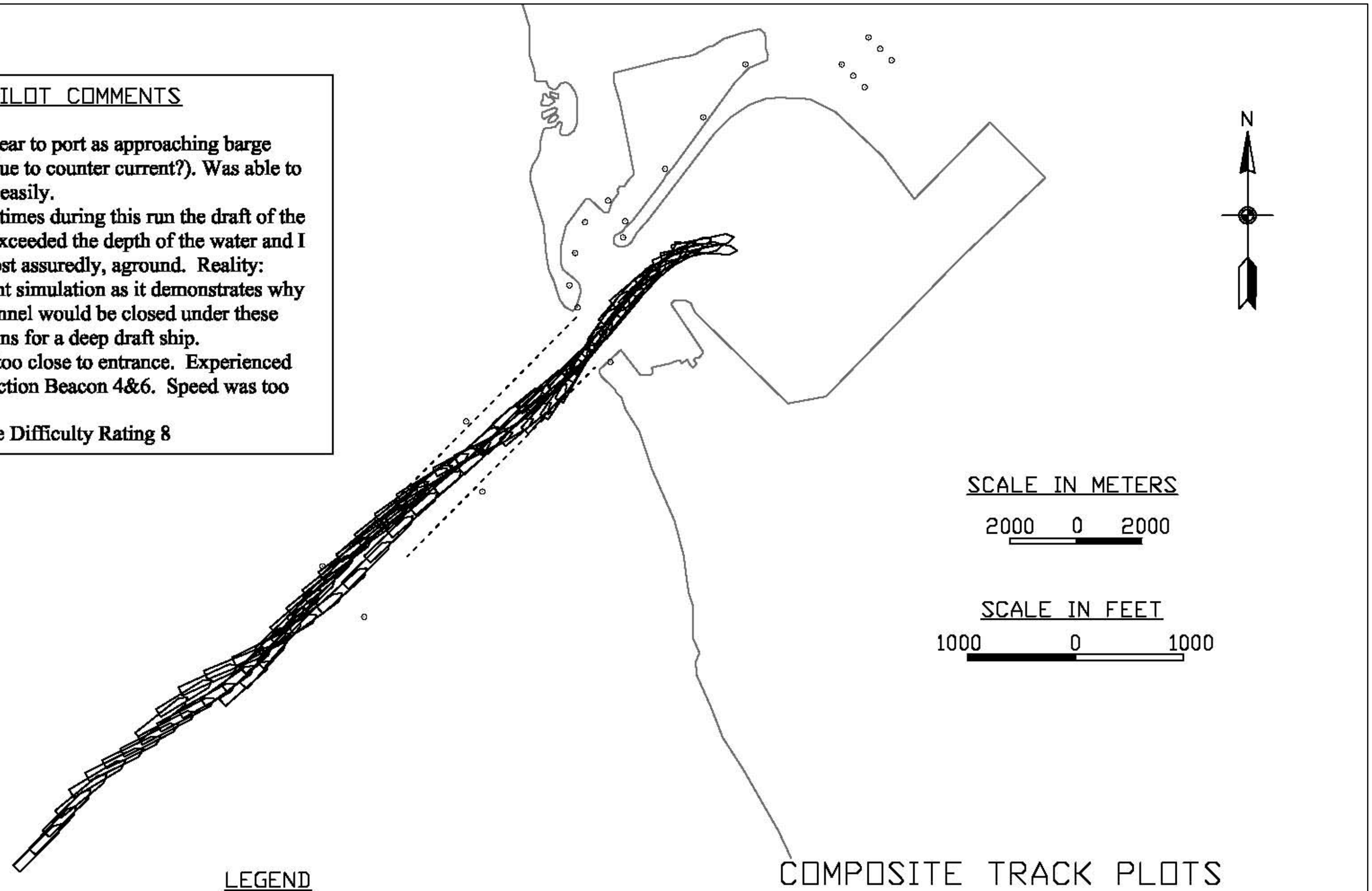

PILOT COMMENTS
Ditto 2 Need lt on s/y jetty.
Qtr ranges very helpful. Took shear to port approaching shoreline.
Minimal effect from wind/swell due to deep draft-pronounced bottom effect - again…slow to react due to dependency on nav. aids.
Had to hold a lot of angle toward red buoys to make the entrance range. Speed was a bit high. Knowing current helped make this run successful.
Average Difficulty Rating 7.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 2 CONDITIONS


PILOT COMMENTS
" Ditto 2" Quarter ranges - very good, color not critical. Could use more horizontal separation. Took shear to port @ shoreline, but was able to recover easily, Quarter ranges are big help. Tough to steady with opposing wind and swell. Quartering ranges a big help on this run. Maintained high speed to counter the strong westerly set in vicinity of Buoys '3' and beacon '5'. Experienced a lot of bank suction at beacon '6'.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
---- CHANNEL
— BANKLINE
∘ NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

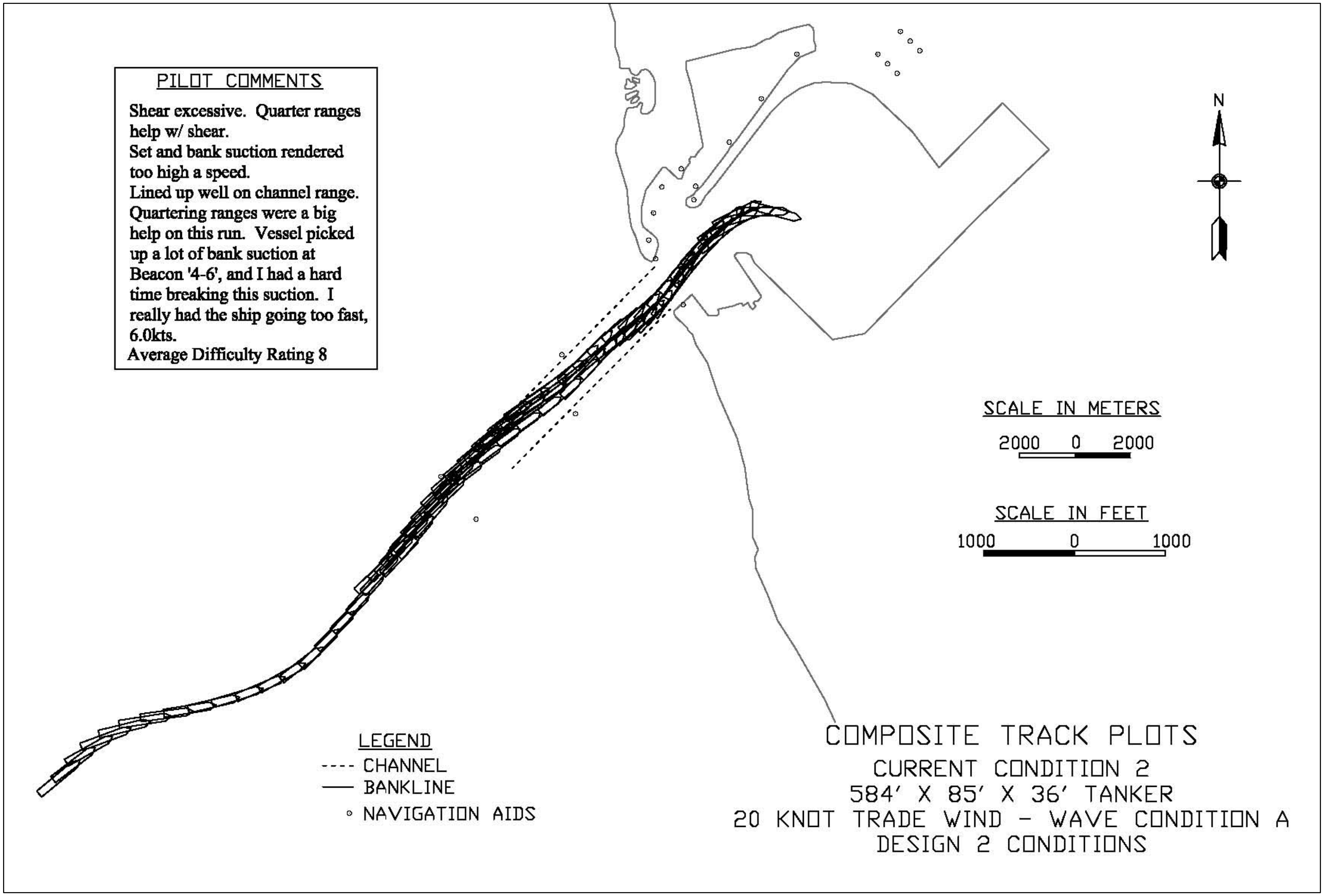

PILOT COMMENTS
Shear excessive.
Shear to port approaching barge basin, recovered w/ hard right rudder. Ok run.
Kept speed up - ok run - fast entering basin.
Difficult wind conditions made for "Squirrelly" transit through channel. Vessel was set down towards western edge of channel.. This time had better control of speed.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS

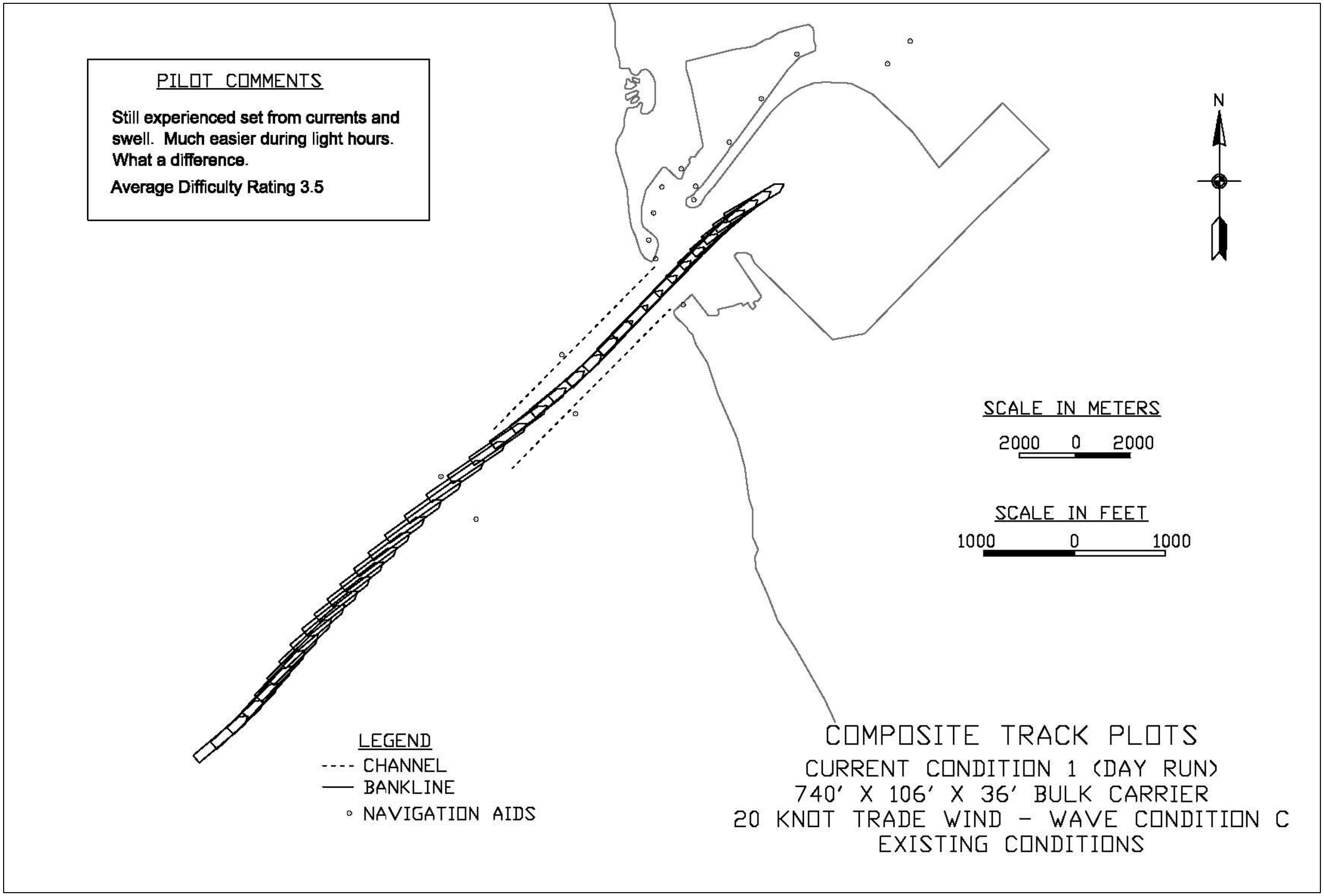
PILOT COMMENTS

Sight shear to port as approaching barge basin (due to counter current?). Was able to recover easily.
Several times during this run the draft of the vessel exceeded the depth of the water and I was, most assuredly, aground. Reality: Excellent simulation as it demonstrates why this channel would be closed under these conditions for a deep draft ship.
Started too close to entrance. Experienced bank suction Beacon 4&6. Speed was too high.
Average Difficulty Rating 8



COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 2 CONDITIONS


PILOT COMMENTS
Shear excessive. Quarter ranges help w/ shear.
Set and bank suction rendered too high a speed.
Lined up well on channel range.
Quartering ranges were a big help on this run. Vessel picked up a lot of bank suction at Beacon '4-6', and I had a hard time breaking this suction. I really had the ship going too fast, 6.0kts.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 2 CONDITIONS


PILOT COMMENTS
Still experienced set from currents and swell. Much easier during light hours. What a difference.
Average Difficulty Rating 3.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1 (DAY RUN)
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION C
EXISTING CONDITIONS

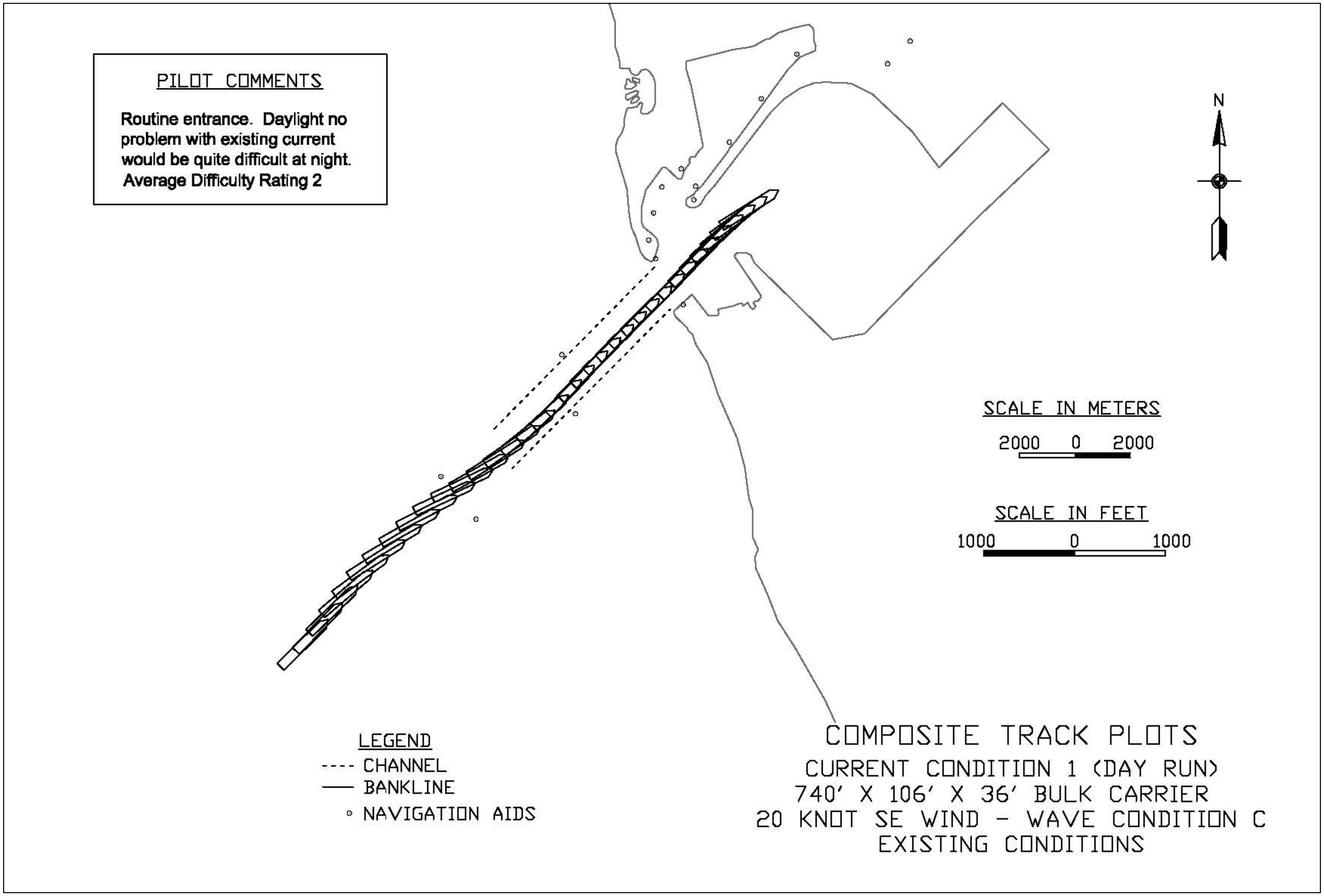
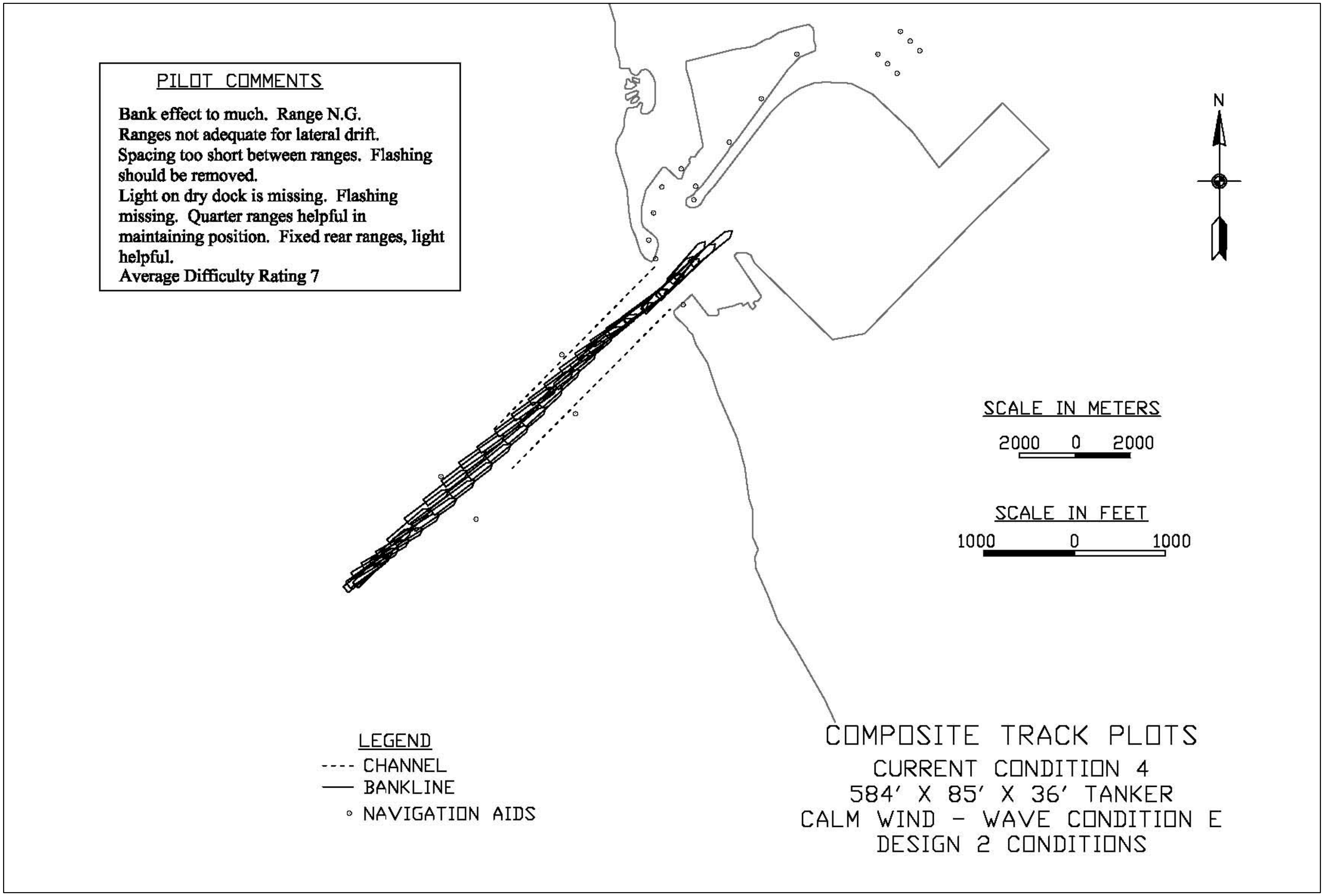
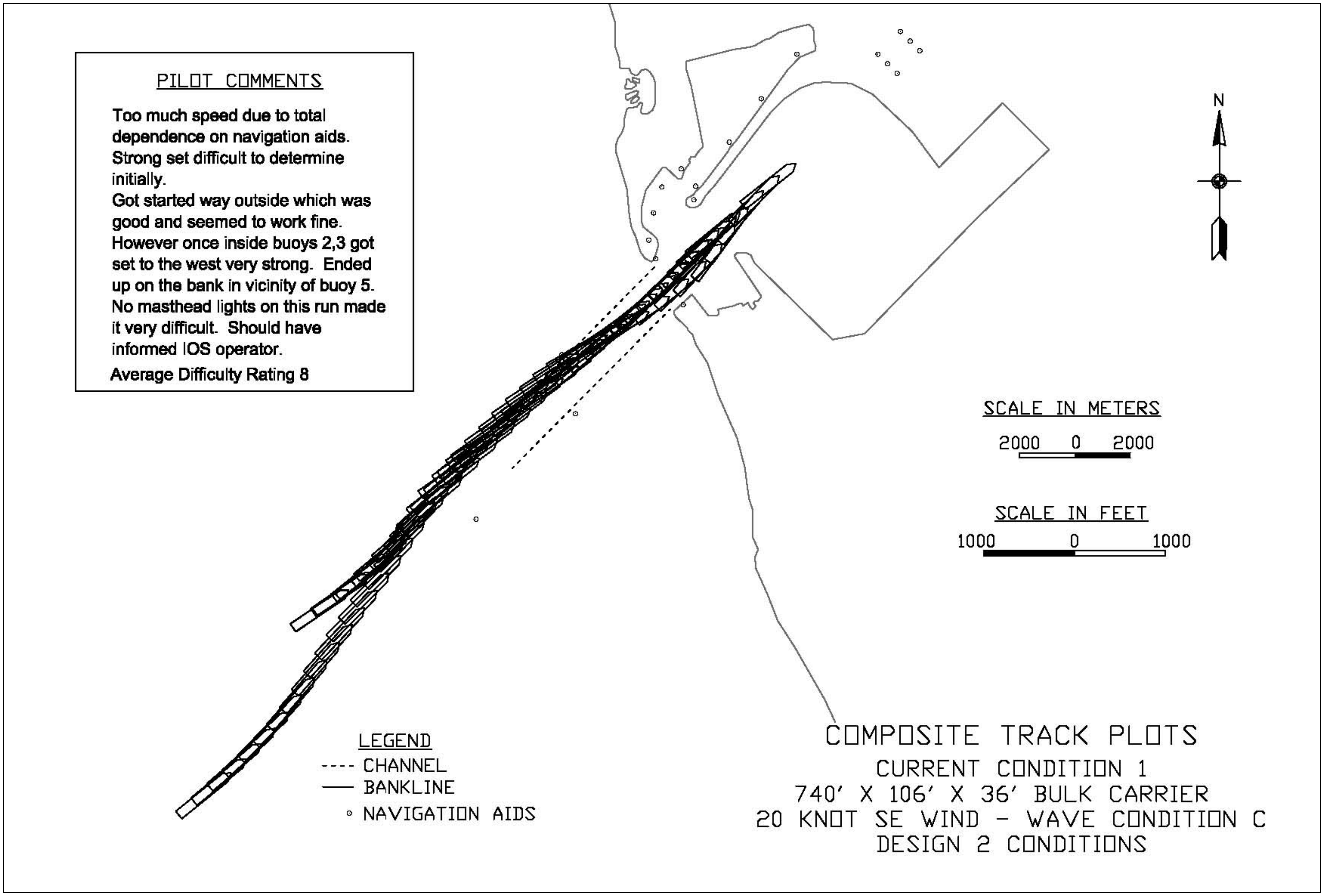

PILOT COMMENTS
Routine entrance. Daylight no problem with existing current would be quite difficult at night.
Average Difficulty Rating 2
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1 (DAY RUN)
740' X 106' X 36' BULK CARRIER
20 KNOT SE WIND - WAVE CONDITION C
EXISTING CONDITIONS

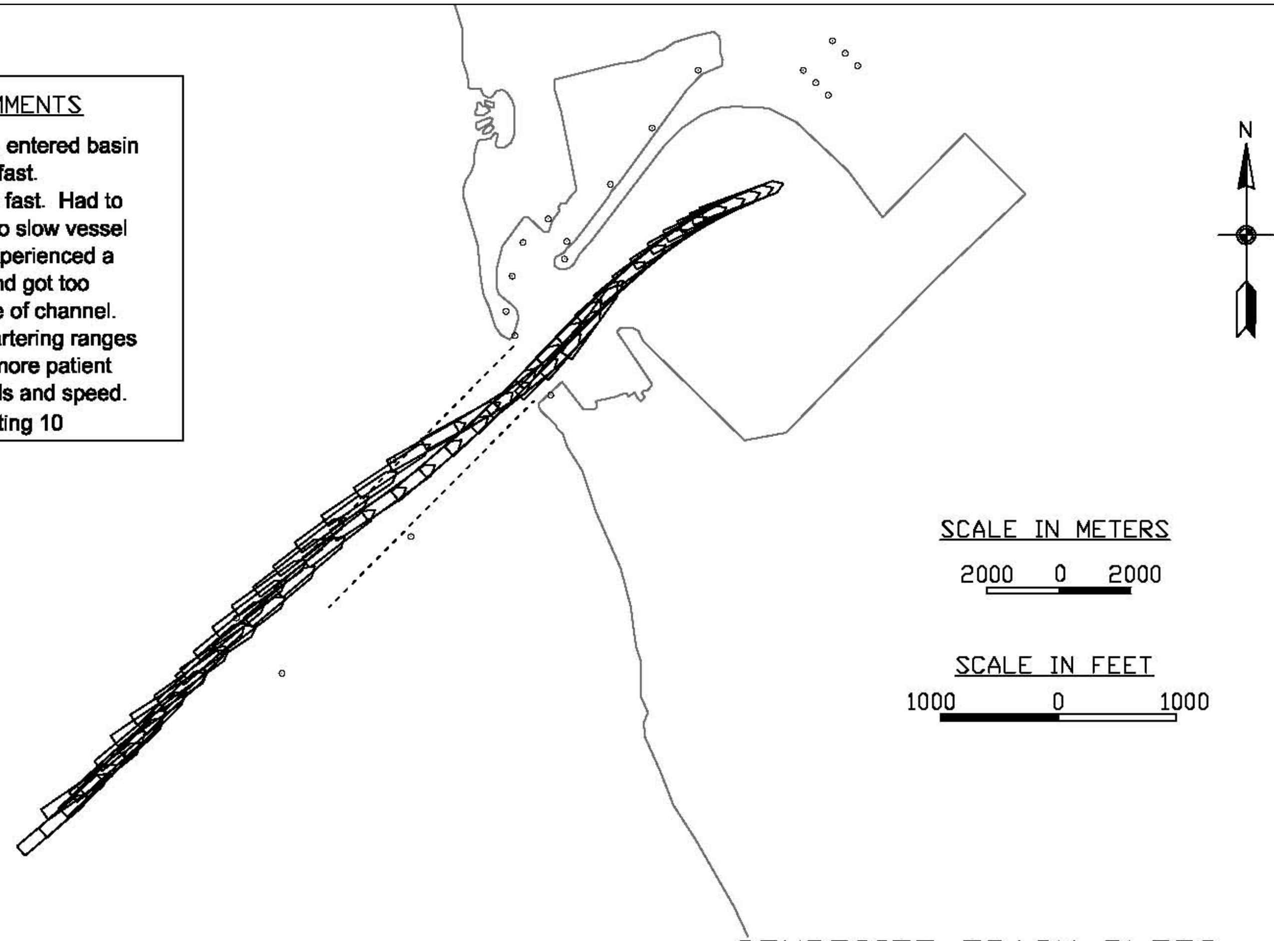
Plate 64


PILOT COMMENTS
Bank effect to much. Range N.G.
Ranges not adequate for lateral drift.
Spacing too short between ranges. Flashing should be removed.
Light on dry dock is missing. Flashing missing. Quarter ranges helpful in maintaining position. Fixed rear ranges, light helpful.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 4
584′ X 85′ X 36′ TANKER
CALM WIND - WAVE CONDITION E
DESIGN 2 CONDITIONS


PILOT COMMENTS
Too much speed due to total dependence on navigation aids. Strong set difficult to determine initially.
Got started way outside which was good and seemed to work fine. However once inside buoys 2,3 got set to the west very strong. Ended up on the bank in vicinity of buoy 5. No masthead lights on this run made it very difficult. Should have informed IOS operator.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT SE WIND - WAVE CONDITION C
DESIGN 2 CONDITIONS

PILOT COMMENTS

Set on reef, port side, entered basin at 7+ knots. Way too fast.
Once again going too fast. Had to use a full astern bell to slow vessel in the main basin. Experienced a strong westerly set and got too close to western edge of channel.
Extra lighting and quartering ranges helped. I need to be more patient with rudder commands and speed.
Average Difficulty Rating 10



LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS

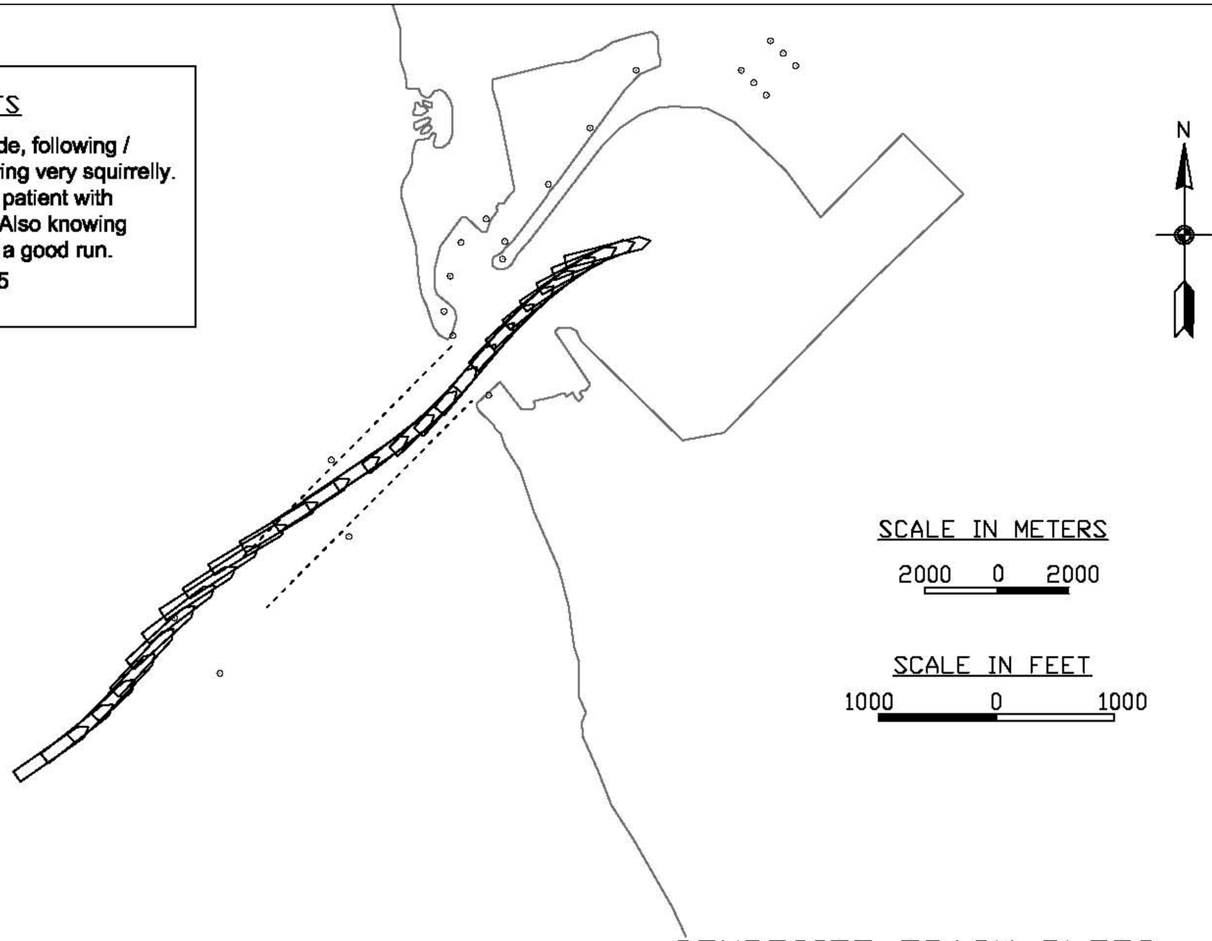
COMPOSITE TRACK PLOTS

CURRENT CONDITION 1
740' X 106' X 36' BULK CARRIER
20 KNOT TRADE WIND - WAVE CONDITION C
DESIGN 2 CONDITIONS

PILOT COMMENTS

May have grounded, port side, following / quartering swell made steering very squirrelly. One of my best runs. Being patient with rudder and engine helped. Also knowing currents assisted in making a good run.

Average Difficulty Rating 9.5



LEGEND

---- CHANNEL

—— BANKLINE

∘ NAVIGATION AIDS

COMPOSITE TRACK PLOTS

CURRENT CONDITION 1

740' X 106' X 36' BULK CARRIER

20 KNOT TRADE WIND - WAVE CONDITION D

DESIGN 2 CONDITIONS

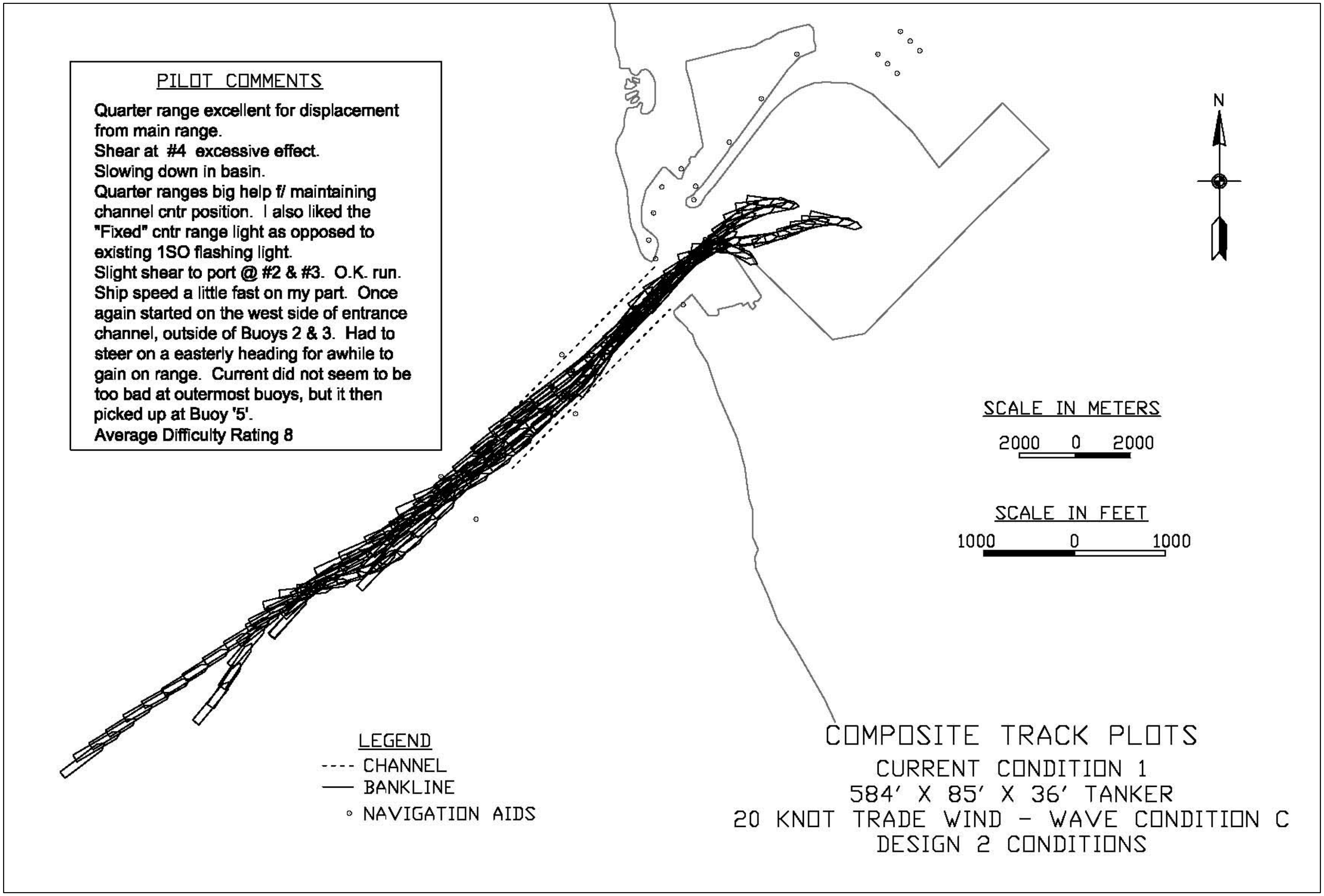
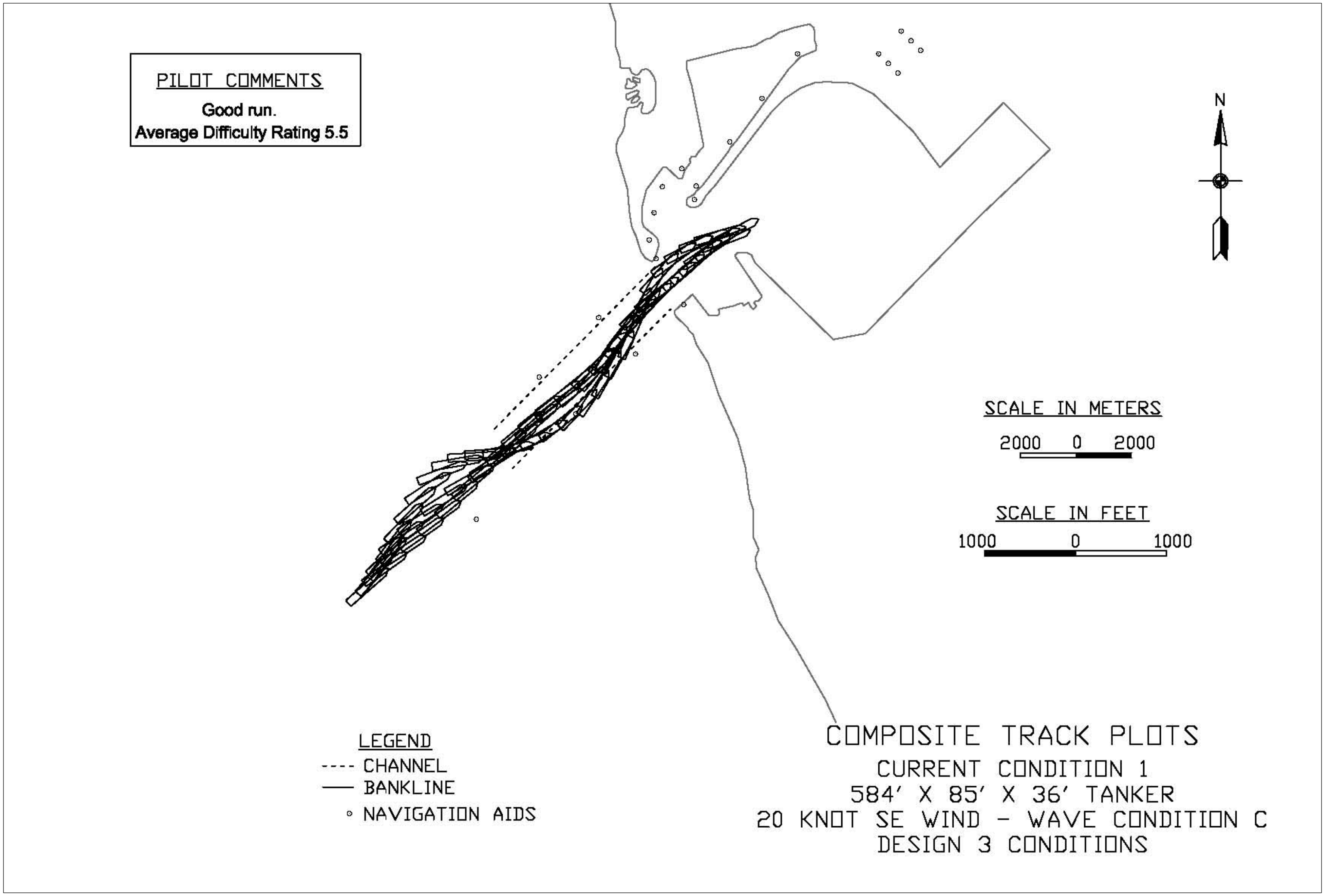

PILOT COMMENTS
Quarter range excellent for displacement from main range.
Shear at #4 excessive effect.
Slowing down in basin.
Quarter ranges big help f/ maintaining channel cntr position. I also liked the "Fixed" cntr range light as opposed to existing 1SO flashing light.
Slight shear to port @ #2 & #3. O.K. run.
Ship speed a little fast on my part. Once again started on the west side of entrance channel, outside of Buoys 2 & 3. Had to steer on a easterly heading for awhile to gain on range. Current did not seem to be too bad at outermost buoys, but it then picked up at Buoy '5'.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION C
DESIGN 2 CONDITIONS

Plate 69



COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584' X 85' X 36' TANKER
20 KNOT SE WIND - WAVE CONDITION C
DESIGN 3 CONDITIONS

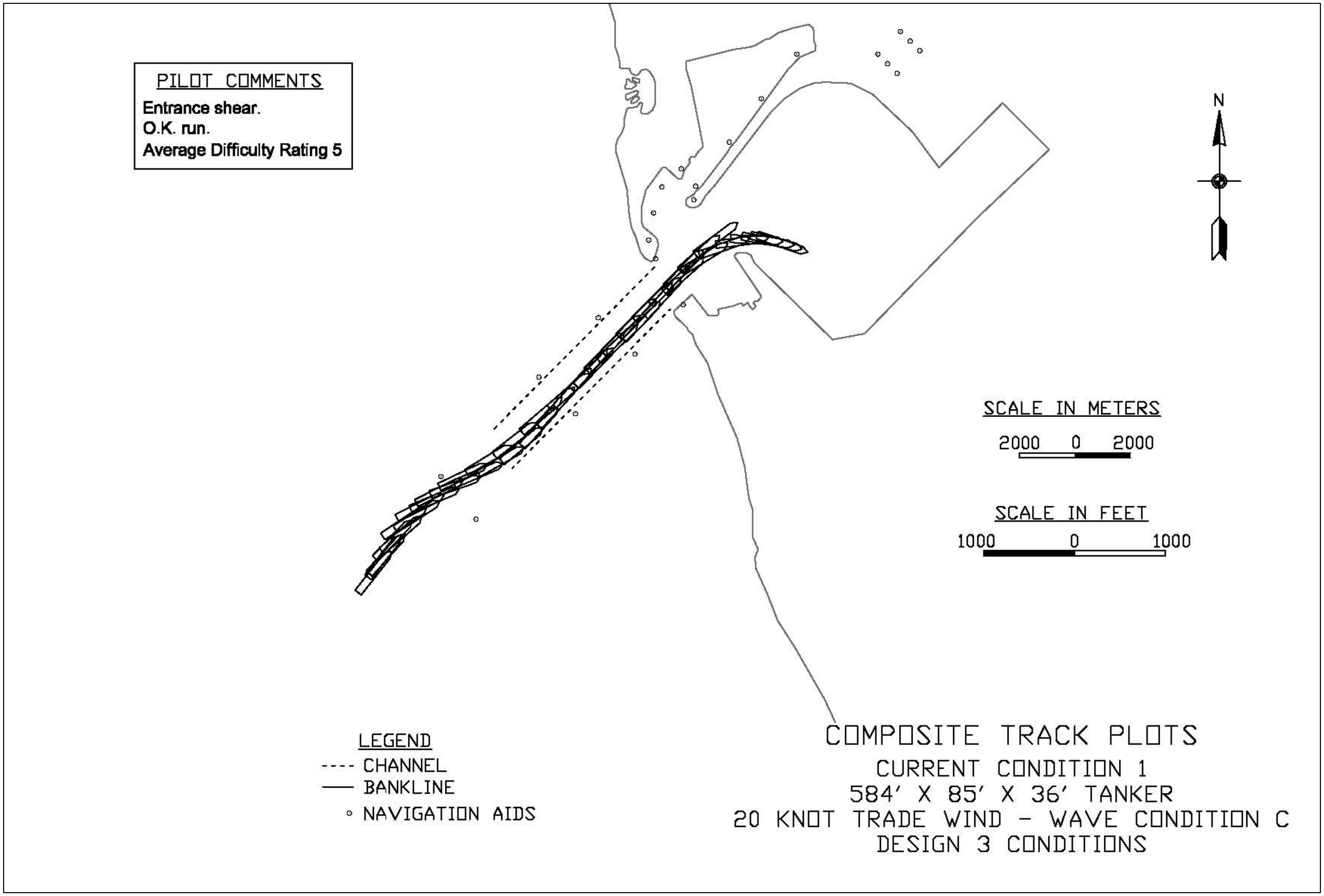
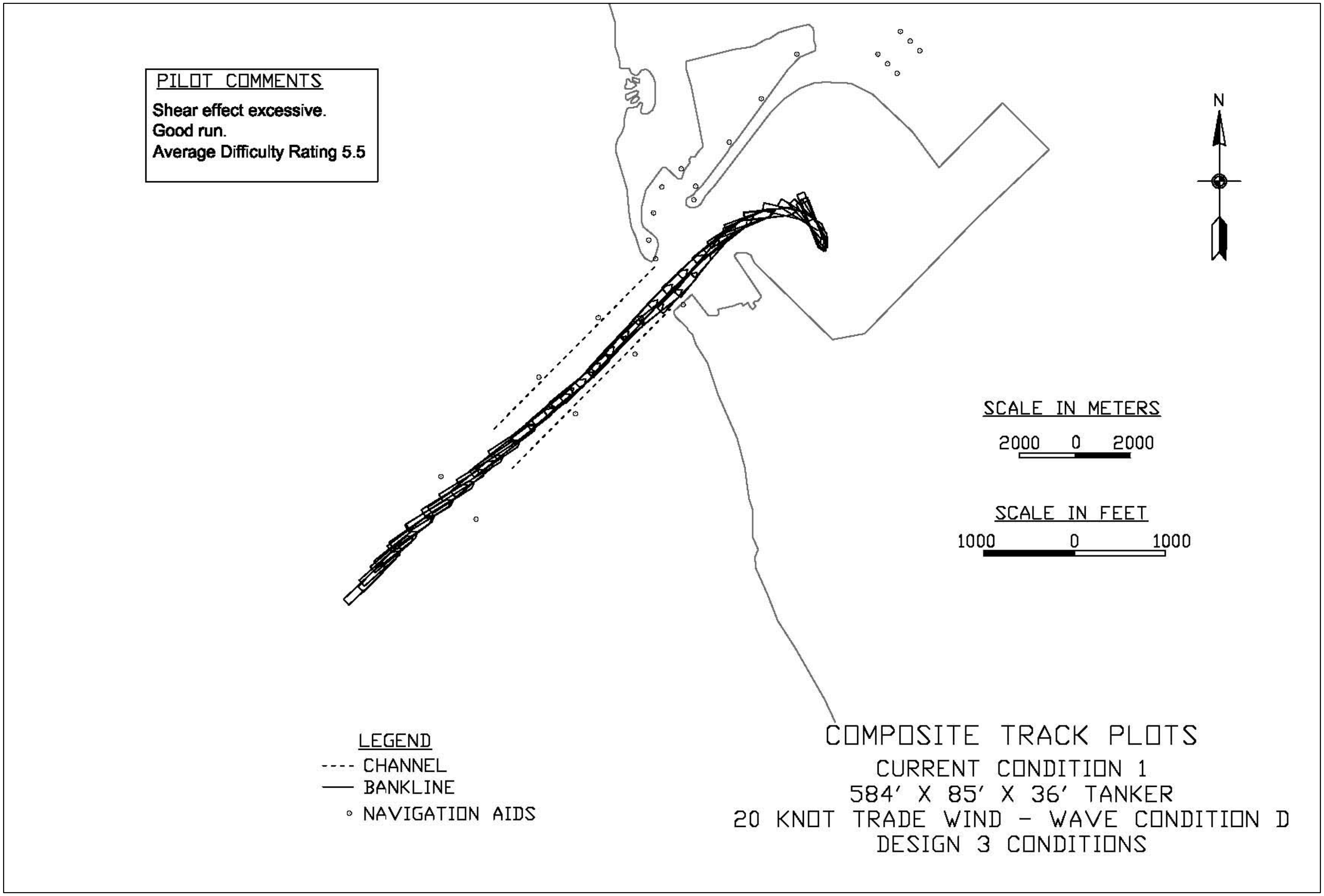

PILOT COMMENTS
Entrance shear.
O.K. run.
Average Difficulty Rating 5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584' X 85' X 36' TANKER
20 KNOT TRADE WIND - WAVE CONDITION C
DESIGN 3 CONDITIONS

Plate 71


PILOT COMMENTS
Shear effect excessive.
Good run.
Average Difficulty Rating 5.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 1
584′ X 85′ X 36′ TANKER
20 KNOT TRADE WIND - WAVE CONDITION D
DESIGN 3 CONDITIONS

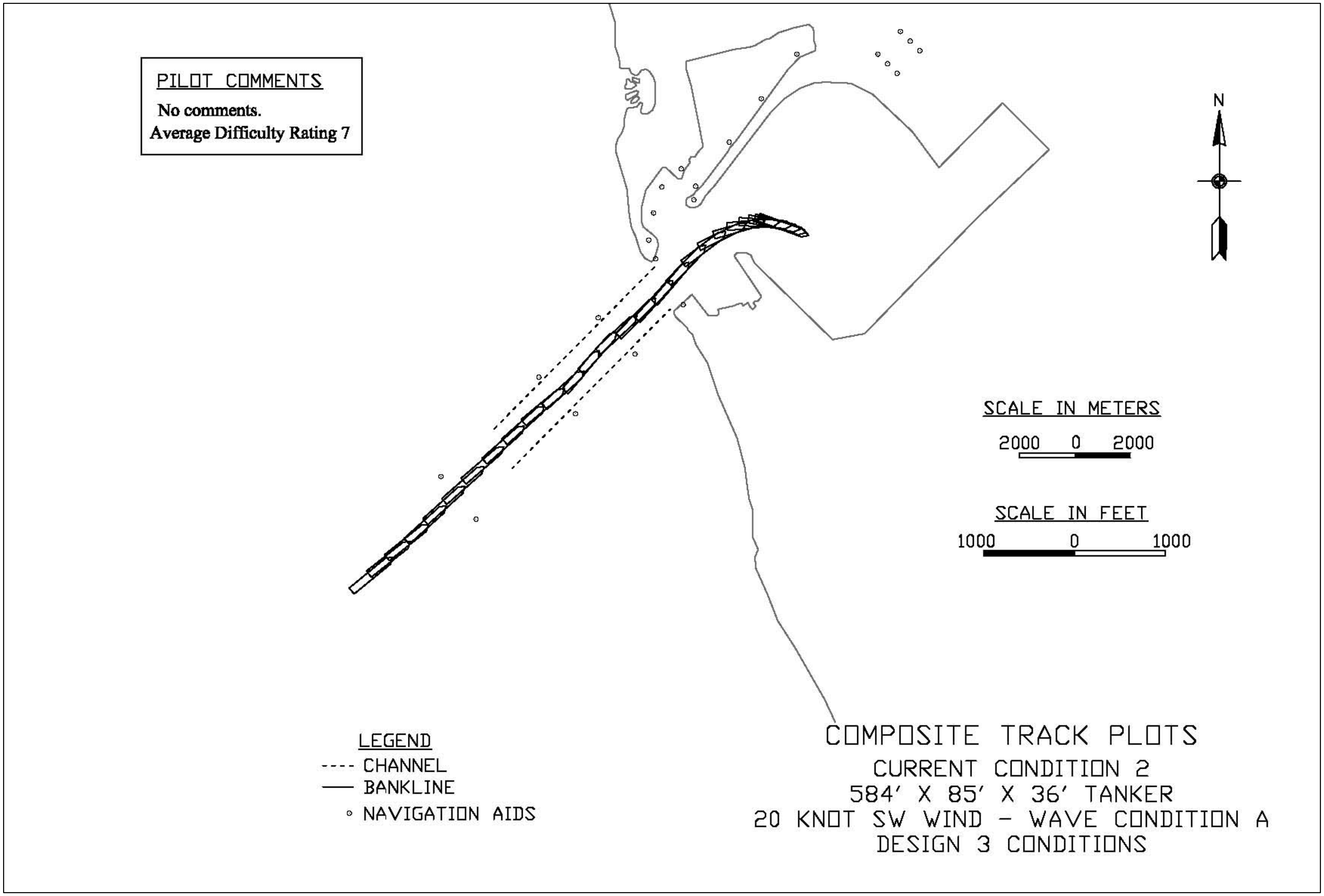
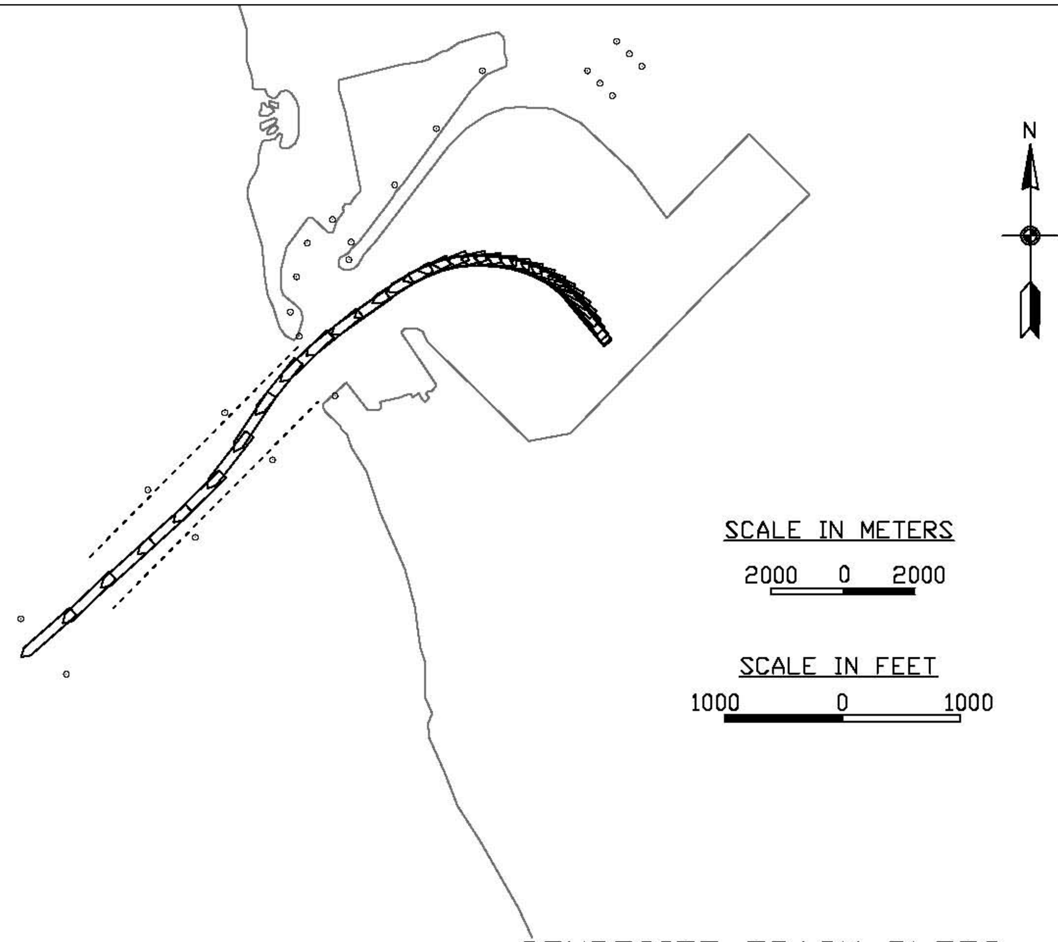

PILOT COMMENTS
No comments.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 3 CONDITIONS

Plate 73

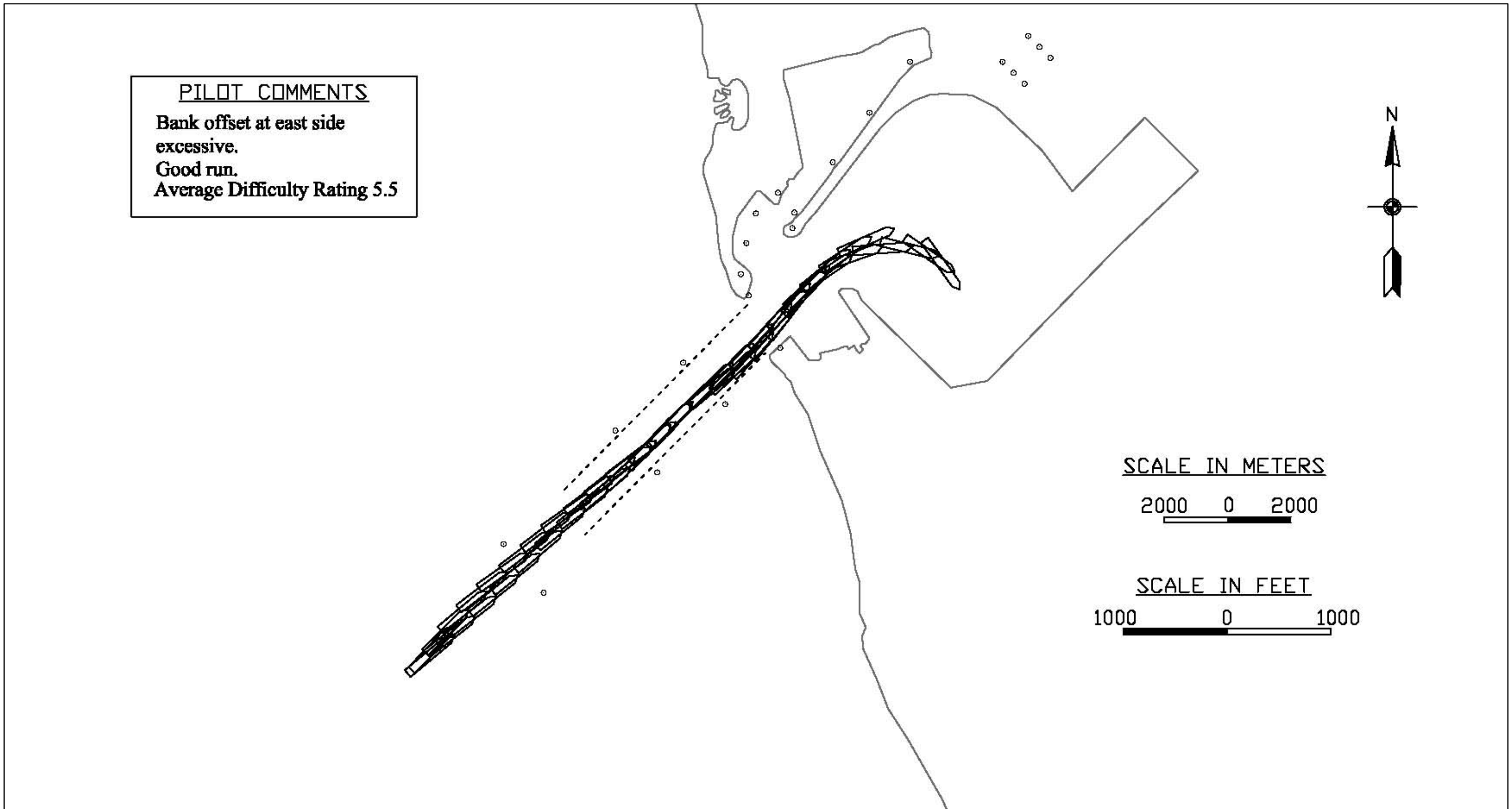
PILOT COMMENTS

Hard to judge line up into channel, but buoy arrangement is helpful.
Average Difficulty Rating 7



LEGEND
---- CHANNEL
—— BANKLINE
∘ NAVIGATION AIDS

COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION A
DESIGN 3 CONDITIONS, OUTBOUND



COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584' X 85' X 36' TANKER
20 KNOT SW WIND - WAVE CONDITION B
DESIGN 3 CONDITIONS

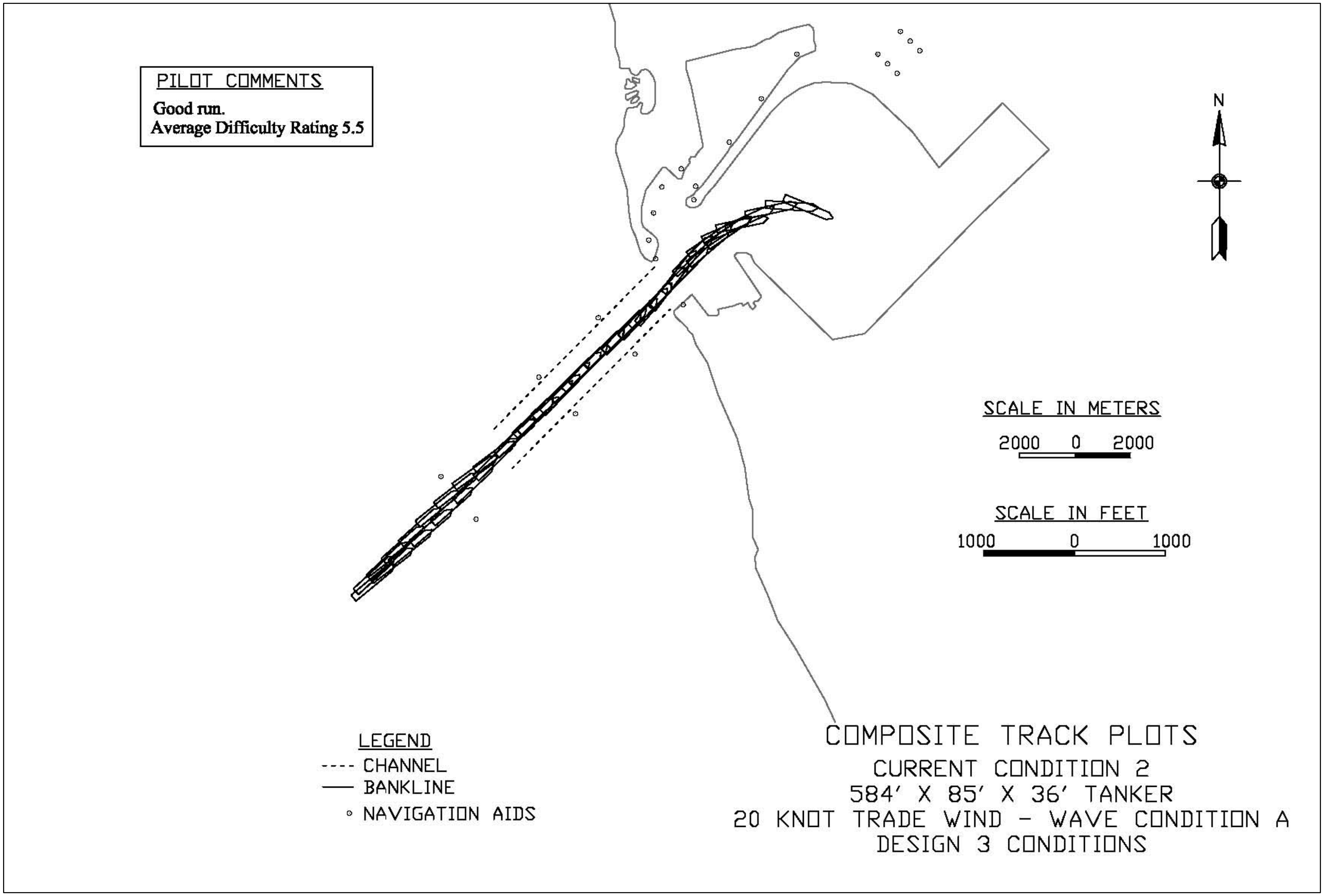
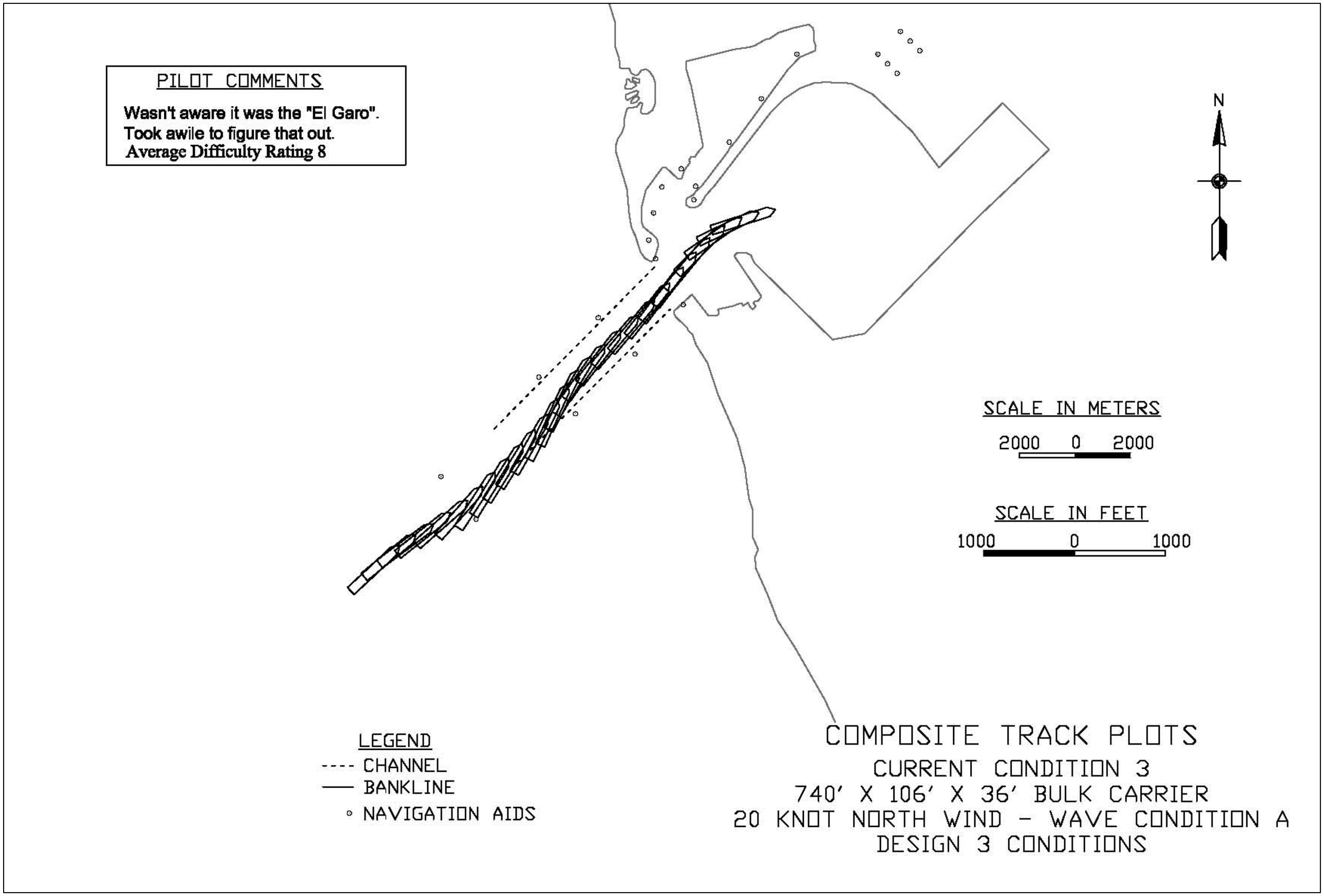
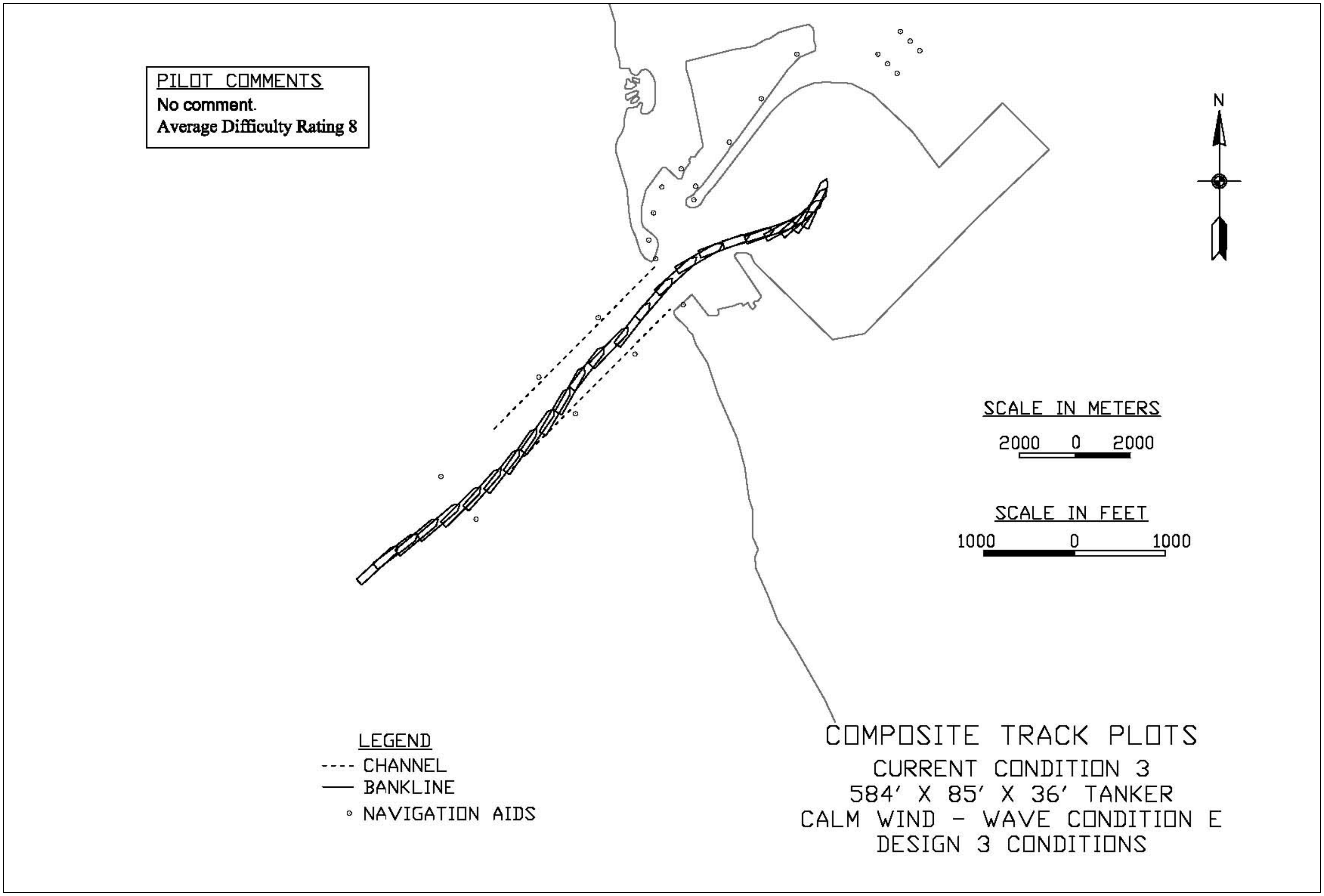

PILOT COMMENTS
Good run.
Average Difficulty Rating 5.5
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 2
584′ X 85′ X 36′ TANKER
20 KNOT TRADE WIND - WAVE CONDITION A
DESIGN 3 CONDITIONS

Plate 76



COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
740' X 106' X 36' BULK CARRIER
20 KNOT NORTH WIND - WAVE CONDITION A
DESIGN 3 CONDITIONS


PILOT COMMENTS
No comment.
Average Difficulty Rating 8
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584′ X 85′ X 36′ TANKER
CALM WIND - WAVE CONDITION E
DESIGN 3 CONDITIONS

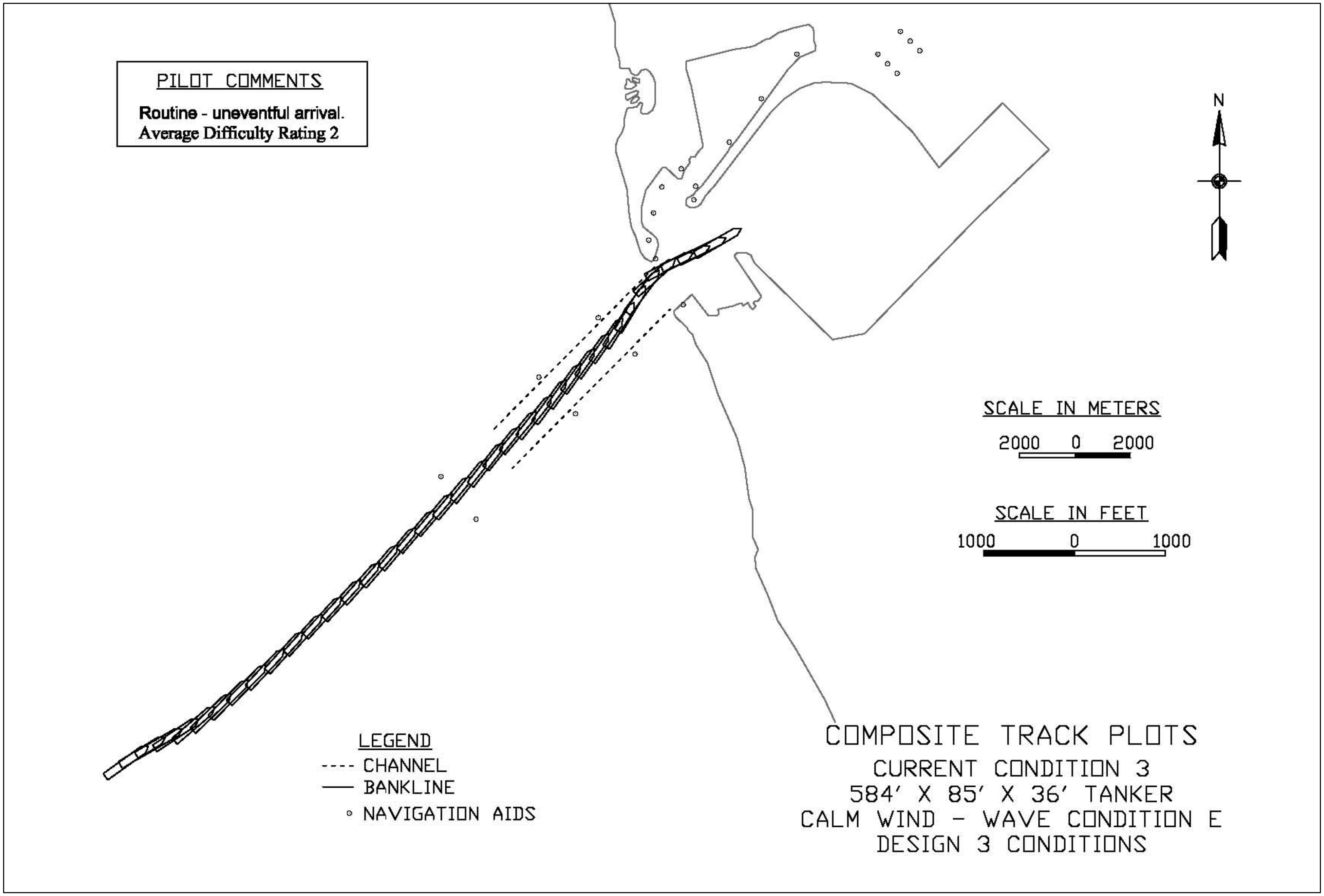
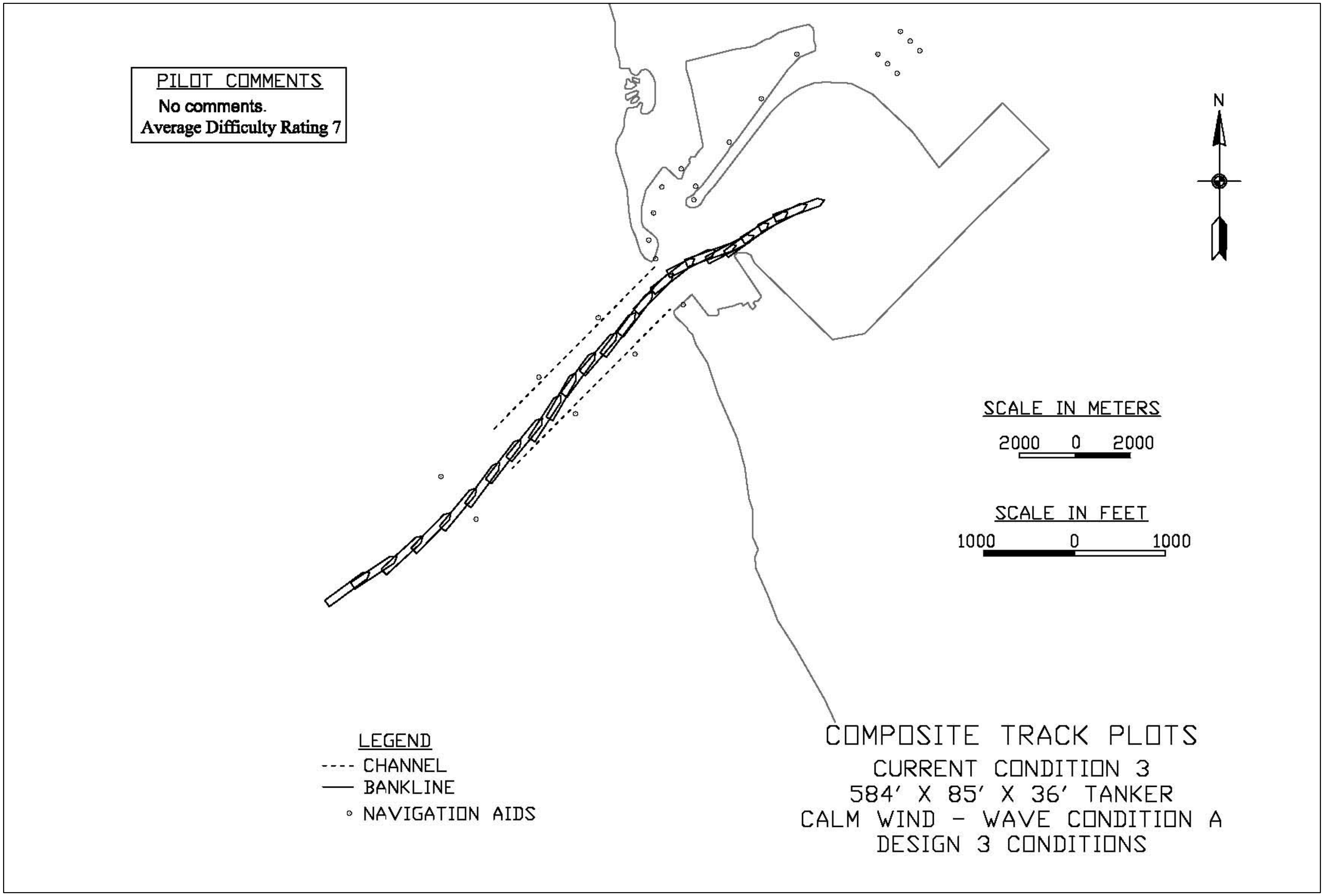
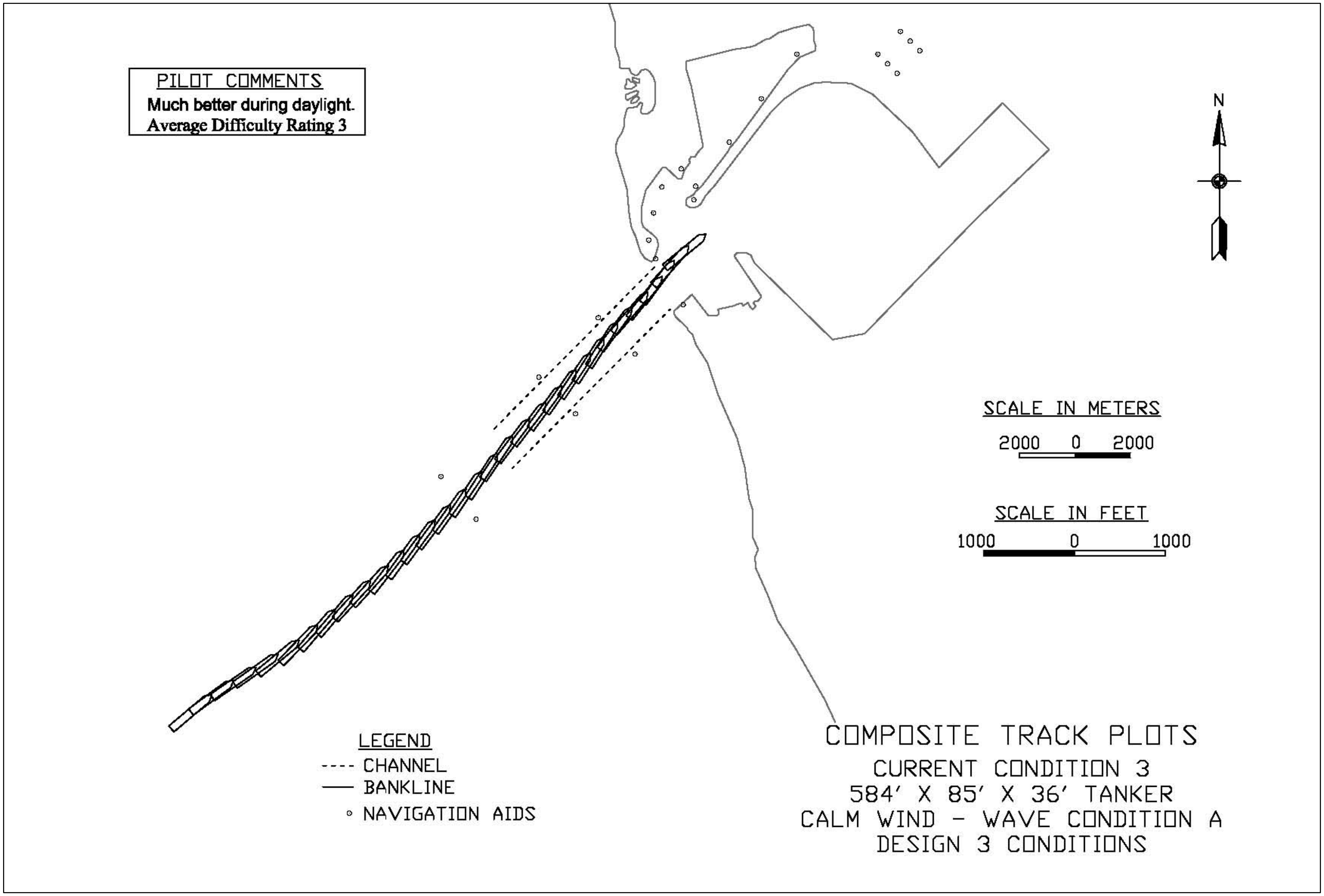

PILOT COMMENTS
Routine - uneventful arrival.
Average Difficulty Rating 2
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584' X 85' X 36' TANKER
CALM WIND - WAVE CONDITION E
DESIGN 3 CONDITIONS

Plate 79


PILOT COMMENTS
No comments.
Average Difficulty Rating 7
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584′ X 85′ X 36′ TANKER
CALM WIND - WAVE CONDITION A
DESIGN 3 CONDITIONS


PILOT COMMENTS
Much better during daylight.
Average Difficulty Rating 3
N
SCALE IN METERS
2000 0 2000
SCALE IN FEET
1000 0 1000
LEGEND
CHANNEL
BANKLINE
NAVIGATION AIDS
COMPOSITE TRACK PLOTS
CURRENT CONDITION 3
584′ X 85′ X 36′ TANKER
CALM WIND – WAVE CONDITION A
DESIGN 3 CONDITIONS

Appendix A: Harbor Master Notices

November 18, 1992

HARBOR MASTER NOTICE NO. 7-92

SUBJECT: VESSEL MOVEMENT AT BARBERS POINT HARBOR

A recent incident has highlighted the need to define more explicitly the restriction on limiting arrivals and departures to daylight hours at Barbers Point Harbor for commercial vessels requiring pilotage.

Arriving commercial vessels shall not enter Barbers Point Harbor:

1. earlier than 30 minutes before <u>sunrise</u>, or

2. later than <u>sunset</u>.

Departing commercial vessels shall not cast off mooring lines:

1. earlier than 30 minutes before <u>sunrise</u>, or

2. later than <u>sunset</u>.

The pilot may further limit these times due to factors of limited visibility, weather conditions, etc.

In the event of an emergency, the Harbor Master may make an exception to this restriction.

Your cooperation and assistance are solicited. This supersedes Harbor Master Notice No. 6-91, dated December 2, 1991.

Patrick E. Torres
Honolulu Harbor Master

Distribution: Shipping Agents; Shipping Companies; USCG Captain of the Port; Pilots Association; Terminal Operators; Oil Companies

bc: HAR-O, HAR-OC, HAR-OC1, HAR-OC2, HAR-OC3, HAR-OCT, HAR-OCB, HAR-OO

May 29, 1992

HARBOR MASTER NOTICE 5-92

SUBJECT: MINIMUM TUG REQUIREMENTS FOR VESSELS USING BARBERS POINT HARBOR

This is to establish the minimum tug requirements for vessels 300 feet or more in length and tank barges going in and out of Barbers Point Harbor.

These requirements are necessary to increase the margin of safety for vessels transiting the harbor due to the physical characteristics of the harbor which limit maneuverability, namely, the narrow entrance channel and strong, unpredictable currents which are, at times, prevalent in that area.

Tug requirements:

1. All tankships carrying petroleum or similar hazardous cargo will have at least two tugs in attendance upon entering or departing the harbor.
2. All tank barges carrying petroleum, LPG, or similar hazardous cargo will have at least one assist tug in attendance upon entering the harbor. An assist tug for departing the harbor will be at the discretion of the tug master.
3. All other vessels with a length of 450 feet or less must have at least one tug in attendance upon entering the harbor.
4. All other vessels with a length of more than 450 feet must have at least two tugs in attendance upon entering the harbor.
5. All ships with a length of 500 feet or less must have at least one tug in attendance upon departing the harbor.
6. All ships with a length of more than 500 feet must have two tugs in attendance upon departing the harbor.

Page 2

If the vessel has an adequate (at least 1,000 horsepower) bow thruster, exceptions to these requirements may be considered by the Harbor Master and the U. S. Coast Guard Captain of the Port on a case basis.

Your cooperation and assistance will be appreciated.

Patrick E. Torres
Honolulu Harbor Master

Distribution: Shipping Agents, Captain of the Port, Pilot Associations, Tug Companies, Oil Companies

bc: HAR-O
HAR-OC
HAR-OC1
HAR-OC3
HAR-OCB
HAR-OCT

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

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		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Gary C. Lynch		**5d. PROJECT NUMBER**
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) *Coastal and Hydraulics Laboratory* *U.S. Army Engineer Research and Development Center* *3909 Halls Ferry Road* *Vicksburg, MS 39180-6199*		**8. PERFORMING ORGANIZATION REPORT NUMBER** ERDC/CHL TR-07-1
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Engineers District, Honolulu Fort Shafter, HI 96858-5440		**10. SPONSOR/MONITOR'S ACRONYM(S)**
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Kalaeloa Barbers Point Harbor is located on the southwestern side of Oahu, HI. The purpose of this study was to analyze the possibility of nighttime transit into and out of the harbor. Changes in navigational aids as well as the addition of shoreline lighting were tested in the U.S. Army Engineer Research and Development Center's Ship/Tow Simulator with the assistance of Pilots from Hawaii. For the possibility of nighttime transit to exist, improvements to the navigational aids, as well as improved methods of predicting the currents at the approach, would first have to be implemented.

15. SUBJECT TERMS

Barbers Point	Hawaii	Nighttime
Harbor	Navigation	Simulator

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED		126	

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